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**THE GRASS-SEED OUTLOOK.**

A. H. COCKAYNE.

**T**HE great war, with Europe the battlefield, will have a far-reaching effect on the grass-seed trade. For many years Germany has dominated the seed-supply business of the Continent, while she has become the most important seed-producing factor in the world. Her great commercial seed-houses have their ramifications all over Europe, and they very largely control the whole of the output of the Germanic and Slavonic nations—indeed, the bulk of the eastern European seed trade has come under their control. The complete disorganization, and probable future complete loss, of this business, which has represented many years of most strenuous effort on the part of the German

merchants, is almost inevitable. Our present concern is the re-arrangement that will have to be made so as to obviate any injurious effect that the dislocation of the German trade implies, and to consider the immediate and future results of the war on the maintenance of supplies of certain pasture-seeds for our own requirements.

Up to the present we have been largely dependent on Germany, either directly or indirectly, for our supplies of many grass-seeds, including white clover, red clover, meadow-foxtail, sheep's and hard fescues, *Lotus major*, *Poa trivialis*, and *Poa nemoralis*, and a considerable number of seeds which are regularly used in the agriculture of other countries but have not become popular in this country and are used only in very limited quantities, such as tall oat-grass, golden oat-grass, chicory, and sheep's burnet. We will now be compelled to look to other sources for these. It will be noted that with the exception of white and red clovers none of the seeds mentioned represent those plants that occupy the dominant positions in New Zealand grass-seed mixtures, so that the cessation of the German seed-supply is not the serious matter for us that may at first sight appear. In fact, a collapse of our American supplies would be a subject of far greater concern, for on the United States and Canada we are almost entirely dependent for our supplies of timothy, red-top, florin, *Poa pratensis*, meadow-fescue, and alsike, all of which, with the exception of meadow-fescue, are important constituents of the pastures of New Zealand. Thus white and red clover are the only really essential seeds our supply of which the war will seriously affect. So far as red-clover is concerned, there is little fear that a serious shortage will be experienced, for, although Germany has been the easiest market from which to secure this seed, many countries, such as Italy and the United States, can supply us with large quantities, to say nothing of Great Britain herself. It is recognized, of course, that we obtain a high proportion of our grass-seed from Britain, but much of this represents transshipments from foreign countries, Germany in particular. The only vitally important pasture seed to us of which supplies will probably be limited by reason of the war, and the price in consequence be abnormally high, will be that of white clover. This seed is not produced to any great extent in New Zealand, but the few tons that are annually harvested locally indicate, in view of the excellent quality and the high returns during most seasons, that its production is a sound proposition to the New Zealand farmer. Adequate supplies, indeed, could easily be produced within the Dominion. This statement applies with equal force to red-clover seed, the production of which already constitutes no inconsiderable industry in several of our agricultural districts.

Seed of the two dominant grasses of New Zealand, cocksfoot and rye-grass, is produced in sufficient quantity not only for our own requirements, but in some seasons in sufficient volume to warrant exportation. Other pasture seeds produced in New Zealand in sufficient quantities for all local needs are Chewing's fescue, danthonia, *Lotus angustissimus*, prairie-grass, tall fescue, and, of course, Yorkshire fog and suckling-clover. With only a slight extension of the area normally under cultivation for three other pasture seeds—meadow-foxtail, crested dogstail, and *Lotus major*—we would be independent of outside sources of supply.

Each autumn a large extent of pasture is added to the occupied area of New Zealand through the conversion of forest and scrub country into grass lands. This process is one that has had a very marked effect on the agricultural exports; in fact, during the past twenty years our rapidly increased production is very largely due to this expansion of our grazing-territory. The continuance of this important movement is one that is likely to be very seriously interfered with by the war. The 1915 sowings will not be affected to any extent, as preparations for clearing the land were in hand before the outbreak of hostilities, while in many cases contracts had been already entered into. Nevertheless the aggregate area to be sown this autumn will be much smaller than usual. I fear, however, that the 1916 bush sowings will be very small indeed, as financial considerations will probably prove a barrier to the development of any such work. As the bush burns absorb each year anything from 2,500 to 3,800 tons of grass and clover seed, it is clear that the demand for pasture seeds will show a great shrinkage in 1916. In many cases where the land, in order to be successfully grassed, has to be sown with seeds that will probably be in short supply and exceptionally dear it will be well to postpone the grassing of such country until normal conditions again prevail. In fact, for the next two seasons at least it would be well if the conversion of forest into grass were restricted to those regions which may be called cocksfoot-ryegrass country. During the next few years it is probable that New Zealand will increase her cereal-growing. An extension of temporary pasture development may be, in consequence, expected. The seeding of such ground is nearly always done with rye-grass and clovers, and for this reason the increased growing of red clover for seed is highly desirable.

Over three-fourths of the grass-seed sown in New Zealand consists of cocksfoot and rye-grass. As we produce more than sufficient for our own requirements of these the outlook from a grass-seed point of view may under the circumstances be considered decidedly satisfactory, notwithstanding that the seed-markets of a country long regarded as the great central avenue of supply are now closed to us.

Were it not for the rather low reading of the financial barometer the bush farmers of the Dominion would have little ground for complaint. The obvious lesson from the dislocation of certain phases of the seed position arising out of the present crisis is that the New Zealand farmer should devote more attention to the growing of pasture seeds rather than looking upon this industry as a by-product of his grazing-lands. This is largely the position of our seed industry of the present day. It has not yet attained the systematized business of the European farmer, who has proved that it is a phase of specialization which in favoured localities it pays well to pursue. The farmers of the Dominion who may be emboldened to embark on this enterprise may do so with every guarantee of security, for there are many reputable seed firms in the country who, by reason of the most modern machinery and plants, are enabled to treat the seed to the best advantage, and who by means of extensive business connections both in the Dominion and abroad are in a position to pay the farmer well for his produce. By prearrangement with these the farmer would enter upon seed-production on an absolutely safe footing. It is most feasible that by an understanding between producers and the trade the total seed requirements of the country would be produced within the Dominion. This would no doubt not only prove satisfactory to the grower, but would be decidedly beneficial to the country in general, as the great annual expenditure on grass-seed, essential in a country where the pastures are the dominant source of the national revenue, would be circulated within New Zealand.

The elimination of the German seed trade affords a unique opportunity for the British Empire to regain her once commanding position in the grass-seed market, and there is no part of the Empire where the possibilities of pasture-seed production are so great as in the Dominion of New Zealand.

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*Consumption of Fertilizers.*—The use of artificial fertilizers by the leading agricultural countries of the world in the year 1912 is shown by the following figures, collected by the International Institute of Agriculture, the volume being shown in quintals, one quintal being equal to 220·462 lb., or practically 2 cwt.: Germany, 59,065,300 q.; United States, 53,364,500 q.; Great Britain and Ireland, 28,230,000 q.; France, 21,161,656 q.; Italy, 11,910,950 q.; Russia, 5,935,176 q.; Spain, 5,813,203 q.; Austria, 5,451,900 q.; Belgium, 5,249,148 q.; Holland, 4,259,220 q.; Japan, 3,707,459 q.; Switzerland, 2,662,868 q.; Australia, 2,655,725 q.; Hungary, 2,293,100 q.; New Zealand, 2,038,830 q.; Canada, 320,183 q.; Argentine, 6,188 q. After New Zealand came a number of countries with a larger consumption than Canada, while Argentine is one of the last on the list.

## THE HEIFER'S BUTTER-FAT PRODUCTION.

### ESTIMATING THE PROBABLE ANNUAL INCREASE.

W. M. SINGLETON.

THE improvement of the producing-capacity of dairy herds has been the central idea with many dairymen for a number of years. The endeavours have been constant, although in many instances they have been misdirected. The natural tendency of the progeny of dairy cows to revert to the average makes improvement a matter of prolonged effort, and it is only through intelligent application of the right methods of breeding and feeding that superior results can be achieved and maintained.

The interest of the enthusiastic breeder is continually whetted by expectations. The young stock are always developing, and for years the owners are looking ahead and endeavouring to forecast the results. When the yield is taken largely as the index of a cow's value the year's production of a heifer after her first calving is looked on by many breeders as the shattering or realization of a long-cherished hope.

The progressive dairyman should be imbued with a goodly portion of the ideal breeder's enthusiasm. With a purebred bull at the head of his herd he should be anticipating an improvement in the producing-capacity of the grade heifers as compared with that of their dams, the disparity of age receiving full consideration. The comparison between records of two-year-old heifers and those of animals of greater age is a matter of which many dairymen may have little or no data. The yearly record of one animal or all of those in one herd may not give a fair comparison of average results. These results will vary considerably from individuals, and, unless large numbers of animals are included, figures may be somewhat misleading.

The yearly average production of 137 two-year-old heifers in test in three associations was 164 lb. of butter-fat. The following season those same heifers as three-year-olds averaged 204 lb. of butter-fat. This record as three-year-olds represents an increase of 25 per cent. on the first season's record. As a rule heifers as two-year-olds are not brought into profit as early as is the case with older animals, and the number of days these were in milk for the two seasons indicates that owners followed the practice on this occasion. When testing purebred stock the two-year-old record

is expected to more closely approximate the three-year-old results. With this class of stock the three-year-old is expected to produce about 15 per cent. more than the heifer starting a year earlier.

Ninety-six three-year-olds were entered by certain members in the associations and were tested two years. As three-year-olds their records credited them with an average yield of 186 lb. of butter-fat. The following season, as four-year-olds, the ninety-six averaged 213 lb. of butter-fat, or an increase of 14 per cent. This increase compares very well with that required of purebred stock in New Zealand of similar ages, a four-year-old purebred being required to give 13.2 per cent. more than a three-year-old.

Eighty-five four-year-olds the first season in test averaged 200 lb. of butter-fat. The following season these averaged 216 lb. of butter-fat, or an increase of 8 per cent. They would be considered mature cows during the second season, and little further increase, if any, may be reasonably expected. These comparative percentages would have been more satisfactory, possibly, could we have followed the same individuals through the four lactation-periods. Using the percentage of increase from year to year as indicated by these figures—namely, 25, 14, and 8 respectively—a heifer finishing her first lactation-period as a two-year-old with 160 lb. butter-fat might be expected to yield 200 lb. as a three-year-old, 228 lb. as a four-year-old, and 246 lb. as a five-year-old or mature cow. For convenient calculation and to suggest a method more practicable for the average dairyman, these percentages of increase for the last two seasons may be slightly modified. If instead of using 25, 14, and 8 as the respective percentages we use 25,  $12\frac{1}{2}$ , and  $6\frac{1}{4}$  the results will be only slightly affected, and the estimated yields would be 160 lb. at two years old, 200 lb. at three years, 225 lb. at four years, and 240 lb. at five years or maturity.

Accepting these last-named figures as a relative proportion approximately correct and sufficiently accurate for the purposes of calculating the estimated yield, the dairymen should proceed as follows: To a two-year-old record add one-half as the estimated yield at maturity, which would increase the 160 lb. two-year record to 240 lb. at maturity; to a three-year-old record add one-fifth, which would increase the 200 lb. three-year record to 240 lb. at maturity; and to the four-year-old record add one-sixteenth, which would increase the 225 lb. four-year-old record also to 240 lb. as the estimated mature record.

This system of estimation will probably prove as simple and as accurate as any for the dairyman engaged in average practical work. It is not suggested that there will not be many exceptions, but, according to the law of averages, these figures should give fairly good expectations of average results..

## THE CARROT.

W. S. HILL, B.Agric.

THE larger portion of the coastal districts of Taranaki consists of a free loam overlying a more or less free and open subsoil, ideal for the growth of the carrot. For many years the carrot has been grown in these districts, and although many farmers attribute their success in feeding dairy stock during autumn and winter months to the judicious use of carrots, there is ample room for the more extensive cultivation of this nutritious root. A few notes on the cultivation, varieties, and feeding-value of the carrot may be of assistance to prospective growers.

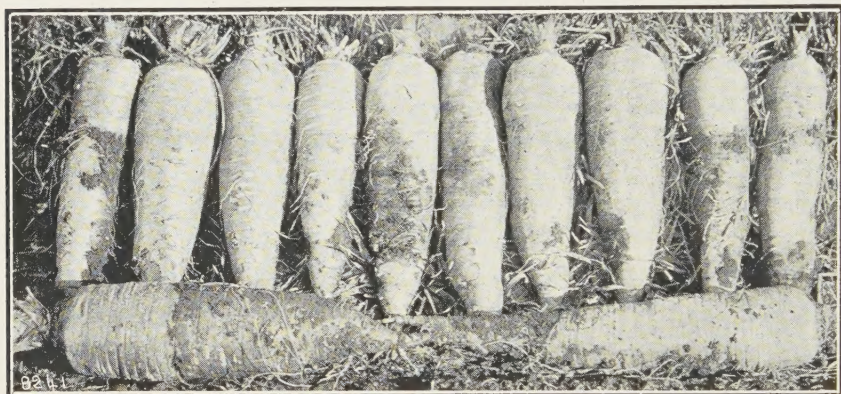
The cultivated form of the carrot (*Daucus carota*) is a biennial which has been developed from an annual weed found in sandy soils. In a deep sandy loam with a free subsoil this crop has ample opportunity for developing long fleshy tap-roots which readily permeate the subsoil in quest of food without the exertion of undue force. Stiffer soils retard full development of the roots. In any class of soil the carrot exerts a beneficial influence by breaking up and utilizing the subsoil.

In the system of rotation practised at Moumahaki Experimental Farm the carrot crop is sown during the first season after breaking up lea land. Good results have been obtained by this practice. Where organic matter is not sufficiently incorporated with the soil or not sufficiently decayed branching of the roots becomes prevalent. A very suitable position for the carrot crop would be after rape. The extensive root-system of rape would leave the soil in a fine pulverized condition so essential for a good germination. The deep-rooting nature of the carrot further assists in the pulverization and opening-up of the subsoil, and thereby increases the feeding-area for subsequent crops. The carrot crop promises to be of value as a preparatory crop for lucerne.

An essential condition of the seed-bed is freedom from weeds. This is of importance, as the seedling carrots are readily smothered by weeds. Deep winter cultivation is beneficial, but on the lighter lands excessive cultivation in spring is to be avoided. As spring advances cultivation would most profitably be directed to consolidating the seed-bed and then creating a surface mulch and controlling weed-growth by light surface cultivation.

A mixture of fertilizers suited to the carrot crop for conditions as at Moumahaki is 2 cwt. of guano, 2 cwt. of superphosphate,  $\frac{1}{2}$  cwt. of sulphate of potash, and  $\frac{1}{4}$  cwt. of sulphate of ammonia. In such a crop as carrots it is preferable to use a liberal dressing to a small acreage rather than stint the quantity of fertilizers for a large acreage. It is the heavy crop that is produced at the least cost per ton.

During the early stages of growth the worst enemies of the crop are weeds. In order to avoid these as much as possible several items pertaining to seeding require attention. Firstly, the seed should be of known vitality and of approved variety. Old seed is inclined to produce many plants that readily assume the annual form. Fresh seed has a characteristic odour which gradually



SUTTON'S MAGNUM BONUM CARROT AT MOUMAHAKI EXPERIMENTAL FARM.  
*W. S. Hill, photo.*

disappears with age. Secondly, in order to give young seedlings a start it is customary to mix the seed with two or three times its bulk of damp sand. This mixture requires turning daily in order to allow access of air. The seed will be fit for sowing about the sixth day, when some of the seeds will be seen to have germinated. The mixture of seed and sand can be incorporated with the mixture of fertilizers without detriment. The young carrot-plants thus come away quickly, and the weeds have a six-days handicap. Thirdly, if sowing takes place during dry weather-conditions, and especially on ridges, it is beneficial to roll with a Cambridge or similar roller, thus ensuring an early supply of capillary moisture for the seedlings.

As to the most economic method of sowing and as to the exact quantity of seed required for each method there is much

to be learnt. At Moumahaki the seed and fertilizers are usually sown on ridges from 26 in. to 30 in. apart. The amount of seed used is 2 lb. per acre. The crop is horse-hoed between the ridges so soon as the weeds require attention. When several inches high the plants are thinned to from 5 in. to 6 in. apart. The advantages of this method are—(1) The fertilizer can be sown both under the ridge and with the seed; (2) the drills are well marked, and if need be the horse-hoe can be used very early; (3) frequent intercultivation keeps the land cleaner and in better condition for the following crop, besides conserving moisture for the growing carrot crop; (4) the roots are more easily lifted on account of greater depth of soil on the ridge. It is not claimed that this method is better than any other, and it is doubtful if so large a yield is obtained by sowing in drills so far apart.

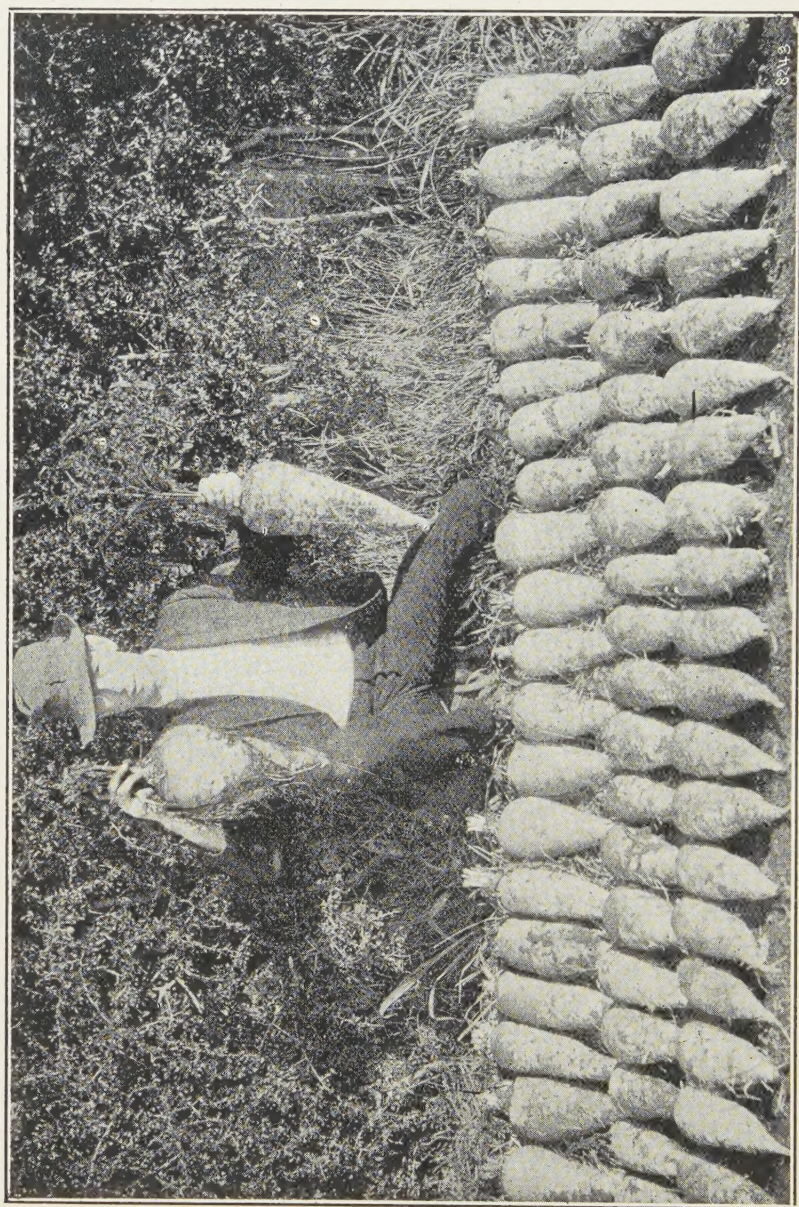
Other methods in vogue are,—

- (1.) To sow on flat by an ordinary grain-drill in 21 in. drills, and cultivate with horse-hoe.
- (2.) To sow on flat by similar drill in 14 in. drills, and hand-hoe.
- (3.) To sow in double drills 5 in. apart with 23 in. between the drills for cultivation with horse-hoe.
- (4.) To sow in alternate drills with mangels.
- (5.) To sow  $\frac{1}{2}$  lb. of carrot-seed per acre in the mangel crop.

A mixture of mangels and carrots is said to be conducive to good returns.

Many satisfactory crops are obtained by the use of 1 lb. of seed per acre and allowing the crop to remain unthinned. This method may be profitable, as chemical analysis has demonstrated that a thick crop of medium-sized roots contains more nutrient matter per acre than a similar yield of larger roots. Wide thinning induces the formation of large individual roots, which are certainly more easily handled. Excessive size of individuals must give way to a medium size combined with a better quality. It is the thinning process that is regarded by many as the most laborious and expensive item in the growing of carrots. Sowing in this district takes place during the month of October, at the same time as the mangel crop is sown. If sown earlier a percentage of the crop is liable to revert to the annual form or "bolt." This locality is at an advantage in that the carrot crop may be allowed to remain in the land during the winter months until the end of August. As the crop does not keep well in pits, fullest use is made of this local advantage.

The varieties of carrots grown for stock-feeding purposes are becoming numerous.



SUTTON'S MATCHLESS WHITE CARROT AT MOUMAHAKI EXPERIMENTAL FARM.

W. S. Hill, photo.]

The variety trials for 1913 and 1914 yielded results as under:—

| Variety.                          | Tons per Acre. |       |        |
|-----------------------------------|----------------|-------|--------|
|                                   | Roots.         | Tops. | Total. |
| 1913.                             |                |       |        |
| Sutton's Matchless White .. ..    | 41·90          | 7·80  | 49·70  |
| Sutton's White Belgian .. ..      | 35·40          | 6·90  | 42·30  |
| Sutton's Magnum Bonum .. ..       | 33·20          | 6·10  | 39·30  |
| Sutton's Improved Red .. ..       | 32·90          | 5·40  | 38·30  |
| Sinclair's Champion .. ..         | 27·40          | 5·20  | 32·60  |
| 1914.                             |                |       |        |
| Sutton's Matchless White .. ..    | 41·47          | 5·14  | 46·61  |
| Hurst's Wiltshire Grant .. ..     | 32·51          | 5·94  | 38·45  |
| Sinclair's Champion .. ..         | 31·79          | 5·49  | 37·28  |
| Webb's New Mammoth White .. ..    | 31·68          | 5·01  | 36·69  |
| Sutton's White Belgian .. ..      | 31·57          | 4·80  | 36·37  |
| Hurst's Yellow Intermediate .. .. | 28·74          | 6·81  | 35·55  |
| Hurst's Merriott Green-top .. ..  | 29·74          | 5·31  | 35·05  |
| Yates's White Belgian .. ..       | 29·55          | 5·07  | 34·62  |
| Webb's Scarlet Intermediate .. .. | 29·97          | 3·54  | 33·51  |
| Sutton's Magnum Bonum .. ..       | 26·79          | 5·90  | 32·69  |
| Hurst's St. Valery .. ..          | 25·49          | 5·43  | 30·92  |
| Sutton's Improved Red .. ..       | 26·49          | 4·31  | 30·80  |
| Carter's Hundred Ton .. ..        | 25·55          | 4·72  | 30·27  |
| Lobberich's Agricultural .. ..    | 24·01          | 4·66  | 28·67  |
| Carter's Orange Giant .. ..       | 23·49          | 4·97  | 28·46  |
| Hurst's Altrincham .. ..          | 20·98          | 5·82  | 26·80  |
| Hurst's James Intermediate .. ..  | 22·09          | 3·84  | 25·93  |
| Carter's Red Elephant .. ..       | 14·94          | 3·14  | 18·08  |
| Average .. ..                     | 27·75          | 5·01  | 32·76  |

Average of forty-one recorded crops, 33·43 tons per acre.

The land on which the 1914 crop was grown had been previously treated in the following manner: A portion was subsoiled to a depth of 12 in. with a subsoil disc plough. This and another portion were treated with 10 cwt. salt per acre six weeks previous to sowing. The average results of eighteen varieties were,—

| Plots.                           | Yield in Tons per Acre. |       |        |
|----------------------------------|-------------------------|-------|--------|
|                                  | Roots.                  | Tops. | Total. |
| Untreated .. ..                  | 24·87                   | 4·05  | 28·92  |
| 10 cwt. salt .. ..               | 27·48                   | 5·33  | 32·81  |
| Subsoiled and 10 cwt. salt .. .. | 31·16                   | 5·33  | 36·49  |

Increase due to salt, 3·89 tons per acre.

Increase due to subsoiling, 3·68 tons per acre.

Of the white-fleshed varieties experimented with, Sutton's Matchless White has for two seasons given excellent returns. This variety is a rapid grower, with abundant foliage, is easily lifted, and lifts clean. The White Belgian is a well-known heavy-yielding variety which stands well out of the ground. Hares are very

partial to such a variety. The Wiltshire Giant and New Mammoth White varieties are heavy yielders and do not grow so much above ground as the Belgian variety.

Of the red-fleshed varieties, Sinclair's Champion has been a consistent yielder for many years, the average yield for nine seasons being 33·64 tons per acre. This carrot was bred for field purposes on this coast and possesses the excellent characteristic of being easily lifted. It is an early maturer and contains a high percentage of dry matter. Sutton's Magnum Bonum and the Barribal are two varieties of merit.

Of the yellow-fleshed varieties, Hurst's Yellow Intermediate and Sutton's Yellow Intermediate have been most constant.

Two varieties new to Moumahaki are Hurst's Merriott Green-top and Lobberich's Agricultural. These are heavy yielders, but lack quality. Webb's Scarlet Intermediate this season produced a creditable yield considering this is primarily intended for a garden variety.

Carrots are relished by horses, cattle, and sheep. They are highly prized as a dietetic for horses, and when so used rapidly produce the "bloom" so essential for show-ring purposes. For milk-production both leaves and roots are valued. In comparison with other crops carrot-leaves have good nutrient properties, as is indicated by the following analyses by Kellner:—

#### DIGESTIBLE NUTRIENTS.

| —                             | Carrot-leaves. | Cabbage. | Rape. |
|-------------------------------|----------------|----------|-------|
| Crude protein .. .. .         | 2·2            | 1·8      | 2·0   |
| Crude fat .. .. .             | 0·5            | 0·4      | 0·5   |
| Nitrogen free extract .. .. . | 4·7            | 6·5      | 3·9   |
| Crude fibre .. .. .           | 1·4            | 1·7      | 1·9   |
| Nutritive ratio .. .. .       | 1—3·3          | 1—5·1    | 1—3·5 |

#### Analysis of roots:—

| — | Carrot. | Mangel<br>(medium). | Swede. |
|---|---------|---------------------|--------|
|---|---------|---------------------|--------|

#### CRUDE NUTRIENTS.

|                               |      |      |      |
|-------------------------------|------|------|------|
| Water .. .. .                 | 87·0 | 88·0 | 87·8 |
| Crude protein .. .. .         | 1·2  | 1·2  | 1·5  |
| Crude fat .. .. .             | 0·2  | 0·1  | 0·2  |
| Nitrogen free extract .. .. . | 9·3  | 8·7  | 8·2  |
| Crude fibre .. .. .           | 1·3  | 0·9  | 1·3  |
| Ash .. .. .                   | 1·0  | 1·1  | 0·9  |

#### DIGESTIBLE NUTRIENTS.

|                               |        |         |       |
|-------------------------------|--------|---------|-------|
| Crude protein .. .. .         | 0·8    | 0·8     | 1·2   |
| Crude fat .. .. .             | 0·1    | ..      | ..    |
| Nitrogen free extract .. .. . | 8·9    | 8·3     | 7·6   |
| Crude fibre .. .. .           | 0·7    | 0·3     | 0·9   |
| Digestible protein .. .. .    | 0·4    | 0·1     | 0·3   |
| Nutritive ratio .. .. .       | 1—12·9 | 1—10·75 | 1—7·1 |

The comparative feeding-value of root crops for fattening cattle and sheep from results obtained at Rothamstead are,—

| Variety of Crop. |    |    |    |    | Food required to 1 lb.<br>Increase in Live<br>Weight. | Live-weight Increase<br>for Ton of Food<br>consumed. |
|------------------|----|----|----|----|-------------------------------------------------------|------------------------------------------------------|
|                  |    |    |    |    | lb.                                                   | lb.                                                  |
| Potatoes         | .. | .. | .. | .. | 60.0                                                  | 37.3                                                 |
| Parsnips         | .. | .. | .. | .. | 75.0                                                  | 29.9                                                 |
| Carrots          | .. | .. | .. | .. | 85.7                                                  | 26.1                                                 |
| Mangels          | .. | .. | .. | .. | 96.0                                                  | 23.3                                                 |
| Swedes           | .. | .. | .. | .. | 109.1                                                 | 20.5                                                 |
| Yellow turnips   | .. | .. | .. | .. | 133.3                                                 | 16.8                                                 |
| White turnips    | .. | .. | .. | .. | 150.0                                                 | 14.9                                                 |

At Moumahaki during the season 1912-13 the average of five varieties of carrots was 40.44 tons per acre. The average of five varieties of mangels grown under similar conditions was 46.32 tons per acre. Similarly, in 1913-14 eighteen varieties of carrots averaged 32.76 tons per acre, and eleven varieties of mangels averaged 52.80 tons per acre. The extra crop produced by the mangels for two seasons averaged 16.37 tons per acre per variety.

The prevailing practice in feeding out carrots is to lift and cart out to dairy stock and sheep as required. The daily ration per cow on pasture supplemented by hay ranges from 25 lb. to 35 lb. For sheep 10 lb. suffices.

A local return for 1912 shows the following figures. Forty woolly lambs per acre of carrots were fed from April to September at the rate of 10 lb. carrots per day on limited pasture.

|                       |    |    |    |    | £  | s. | d.   |
|-----------------------|----|----|----|----|----|----|------|
| Wool, 8 lb. at 9d.    | .. | .. | .. | .. | .. | 0  | 6 0  |
| Carcase               | .. | .. | .. | .. | .. | 0  | 14 0 |
| Gross return per head | .. | .. | .. | .. | 1  | 0  | 0    |
| Cost per head         | .. | .. | .. | .. | 0  | 8  | 0    |
| Profit                | .. | .. | .. | .. | 0  | 12 | 0    |

Forty lambs per acre of carrots showed a profit of £24 per acre. The crop yielded at the rate of 51.94 tons per acre, and was grown from 1 lb. of seed per acre in 14 in. drills. The experimenter considers carrots are the best wool-, flesh-, and bone-producing winter food for lambs that he has yet used. (The experimenter has not yet used lucerne.)

While the carrot crop has generally been considered of minor importance, it appears that under favourable conditions of soil, climate, and husbandry this crop is deserving of more consideration.

If the stock were allowed to be the judges of what they preferred for winter fodder, the carrot would be cultivated over a much larger area than is at present devoted to it.

The better feeding of live-stock, especially in the winter months, is one of the most pressing problems of the New Zealand farmer, and the carrot is one of the most nutritious supplementary fodders that can be produced.

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## LUCERNE IN AMERICA.

E. CLIFTON.

THE recognition of alfalfa and any information regarding it, I believe, will always be welcome in New Zealand. Whatever may be the development in our country, it is assured that of all field crops none is attracting more attention here, none is appealing more successfully to the farmer. To show the interest that is being taken in this crop and the volume of its increase in one State alone—Nebraska—it is stated that in 1910 there were but 49,985 acres, and during the season just ended the acreage has been increased to 685,282. The total yield was 1,522,000 tons, of a total value of \$10,733,000, and the price is increasing. The officer of the Department of Agriculture who reports this states that he is quite satisfied that the next census will show this ten-million-dollar crop vastly increased. He believes that alfalfa will be the dominating crop throughout the stock-raising districts of the Union.

The experience of many years of alfalfa-raising is epitomized into a few lines. It is claimed in the first instance that on reasonably well-drained land profitable crops of alfalfa can be raised. These requirements are—freedom of the land from weeds, sufficiency of lime, the selection of suitable varieties, and essentially well-drained location. In regard to the freedom from weed-seeds, it has been observed that it is not alone necessary to continually work over the soil with a cultivator; that the success attending the cleaning of the soil is to permit the weed-seeds to germinate in the spring, to destroy them as they germinate; not to hasten the seedling—to retard this until several germinations of the weed-seeds have been permitted to appear, and then possibly even dangerously late in the season. The most successful farmer claims that by adopting this course he succeeded in one spring in cleaning his land and

securing a crop of alfalfa that was the envy of his neighbours. This he did by the process already mentioned. During spring cultivate early; permit the seeds to germinate—not more than germinate—then cultivate and destroy them. Sow when the land has been cleaned, by cultivation, after germination of the weed-seeds in the soil. This plan has been objected to by some people on the ground that in the early summer it is found that the soil becomes somewhat dry, but they overlook the fact that after this careful cultivation the dust mulch provides a moistened condition under the surface, thus ensuring an ideal seed-bed.

The next point—the sufficiency of lime. It is claimed in America that failure after failure has been recorded where the general belief was that alfalfa could not succeed in certain districts or in certain soils, and that this has been almost invariably overcome with the addition of 1 ton of lime per acre.

In the selection of the most suitable variety, observations at MacDonald's College have led to the conclusion that the Grimm alfalfa is the best for a rigorous climate. Now, it is by no means suggested that this particular variety of alfalfa is the most desirable for New Zealand. The climate of that country and the conditions are essentially different from those of Canada, but this all leads up to the recommendation that it is proposed to make—namely, that every farmer should plant varieties of alfalfa. It may be that in an especial district some one variety has become the most dominant, but small plots of this important field crop cannot fail to provide valuable information to the farmer. The demonstration at Moumahaki is an example of this. There are many varieties in one of the fields, and had it been that the seeding had been confined to one variety the province would not have assured the establishment of a profitable crop of alfalfa in that locality. The difference between this variety and that of Hunter River and Marlborough grown seed is striking. It forces itself more and more upon one's conviction that to a country such as New Zealand, where plants grow during a great many months of the year and where the maintenance of live-stock is the all-important factor, there is no crop that can approach the value of alfalfa.

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The Argentine had 13,906,347 acres in lucerne in 1912, an increase exceeding two million and a quarter acres over that of two years before. This vast acreage is almost entirely grazed, and grazed in large areas. Although these figures at first sight appear stupendous, they are not to be wondered at when it is considered that in Argentine lucerne takes the place of the whole of our supplementary pasture crops in addition to being the ordinary pasture of the country.

## THE CURD TEST.

### A MEANS OF DETECTING IMPURITIES IN MILK.

W. E. GWILLIM.

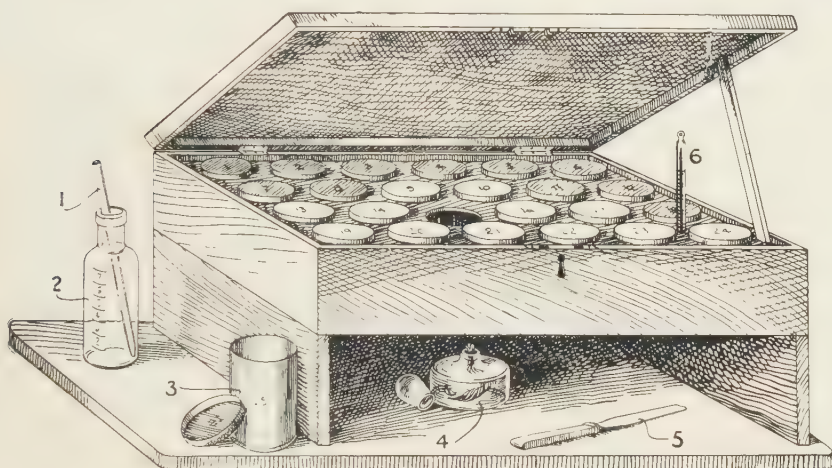
THE curd test was devised, in the first place, to enable cheesemakers to detect supplies of milk containing micro-organisms or ferments unfavourable for the production of sound-flavoured cheese of good body and texture.

Milk frequently contains impurities, taints, or undesirable ferments which are not made perceptible by ordinary means of inspection employed at the time the milk is accepted for manufacture into cheese, but which reveal their presence during the making process, and cause pinholed, gassy, and ill-flavoured curd, and result in cheese being defective in both flavour and texture. In the making of cheese from milk of this description considerable extra time and energy is entailed, and, as a rule, the loss of cheesemaking solids is greater than is the case with milk of sound quality. Impurities in milk are usually due to preventible causes, as, for instance, exposing milk to an impure atmosphere, using unclean dairy utensils, allowing dust and other foreign matter to get into milk, cows drinking impure water, &c.

The test consists, practically, of making conditions favourable for the rapid development of the ferments in milk by applying the leading principles of the process of Cheddar-cheese making to a small quantity of milk, and judging the milk for its freedom or otherwise from impurities by the character of the resultant curd. The test can be applied to the milk of individual cows or to the mixed milk of herds of cows. It is simple and inexpensive to operate, and, although it takes some few hours to perform, it is one of the quickest and most useful tests yet introduced for the purpose. The cost of a testing outfit is trifling. Although the test was designed for the assistance of cheesemakers, it is of value to users of milk for other purposes, since the good-keeping quality of milk or of milk-products is necessarily influenced by the purity of the material in the first instance.

## GRADING MILK AT DAIRY FACTORIES ACCORDING TO ITS PURITY.

The curd test originated at the Wisconsin University, U.S.A., and was introduced into New Zealand by Mr. W. M. Singleton in 1901. It is known to all cheesemakers. So far its use has been confined mostly to demonstrating to cheesemakers and to suppliers of milk to dairy factories some of the ill effects of milk in a condition otherwise than sound and clean. Supplies of milk to factories vary considerably in purity and sanitary condition. The test has on numerous occasions been the means whereby many progressive dairy-farmers have been induced to effect improvements in their methods of handling and caring for milk. The work on their part has been almost purely voluntary, and the reward little more than the satisfaction of having recognized their responsibilities and performed their duty.



CURD-TESTING OUTFIT.

1. Small pipette. 2. Graduated bottle. 3. Tinned sample-can. 4. Spirit-lamp.  
5. "Palette" knife. 6. Glass "dairy" thermometer.

The sanitary condition of average supplies of milk delivered at dairy factories is open to improvement, and so long as milk is valued only by its butter-fat content there seems no very particular inducement for the average milk-supplier to aim for a higher standard of purity. Recently the Director of the Dairy-produce Division of the Department suggested that milk should be valued according to its purity as well as for its content of butter-fat, and that the curd test be used to determine the relative standard of purity or sanitary condition. The method outlined was for an independent operator or milk-grader to attend the dairy factory

once during the currency of the company's weekly or third-part monthly period of testing for butter-fat, to take a sample of each supplier's delivery of milk and judge the degree of purity by the curd test and record the grade, the sample to be considered as representative of the total supply delivered during the period, and the suppliers to receive payment according to the grade. Thus, if, say, two grades of quality were decided upon, the first-grade quality would receive the full price advanced for each pound of butter-fat, and the second-grade quality a lower price. The company, as heretofore, to retain its right to reject milk considered, by the ordinary means of inspection, to be unsuitable for manufacturing purposes. Only one grade of produce to be manufactured. The differential payments to be made in order (1) to encourage suppliers to try and obtain the first-quality price, and (2) because the lower-quality milk lowered the general average quality of the company's produce.

The adoption of this method of purchasing milk would remove the present unfairness of paying the same price for sound quality as for indifferent quality.

#### OPERATING THE CURD TEST.

The method of operating the test, and the description given here of the outfit for testing twenty-four samples at one time, is the method and outfit generally used by the instructors in cheese-making. Outfits can be made to any desired size or pattern. Where an outfit is not available and there is only a single or a few tests to be done, an ordinary household covered-top preserve-jar of one- or half-pint capacity and a can or wooden bath for holding the test in warm water may be used. No very exact quantities of materials are required for a test. The principal points to be closely observed in operating the test are—

- (1.) The use for each test of a clean and sterile test-tin, thermometer, and curd-cutter.
- (2.) Maintaining the temperature at the degree specified.
- (3.) Keeping the tests covered as much as possible.
- (4.) Removing as much whey as possible.

#### THE APPLIANCES REQUIRED.

The appliances required for testing twenty-four samples at one time are as follow:—

- (1.) Tinned cans (preferably of tinned copper, and seams filled with solder finished smooth) with close-fitting lids. Capacity, about half a pint; size,  $3\frac{1}{2}$  in. by  $2\frac{1}{2}$  in. Cans and lids to be numbered 1 to 24.

- (2.) Tinned bath with close-fitting lid, covered on all sides, except the bottom, with woodwork lined with sheet asbestos, to provide insulation. The size over all should be about 22 in. by 14 in. by 5 in., and it should be provided with a stand about 5 in. high enclosed on three sides, the front being left open to admit a spirit-lamp. Bath should be fitted with a holed rack to keep tins in position, an outlet for water being provided at the bottom and near side, and a hole through lid for a thermometer.
- (3.) Glass "dairy" thermometer.
- (4.) Thin-bladed "Palette" knife for cutting curd.
- (5.) One 60 c.c. "Dropper" bottle or small pipette for measuring rennet-extract.
- (6.) Small spirit-lamp and supply of methylated spirits.
- (7.) A supply of rennet-extract.

#### INSTRUCTIONS FOR MAKING THE TEST.

The instructions for making the test are as follow:—

(1.) The tins, including the covers, are thoroughly cleaned and then sterilized with boiling water or live steam.

(2.) Each tin is filled about three-parts full with the milk to be tested, and the cover put on, the tin being then placed in the bath.

(3.) The bath is filled with hot water, to quickly bring the temperature of the milk to 88° F. The thermometer must be made sterile by rinsing in hot water before being placed in each sample, to avoid carrying contamination from one sample to another.

(4.) When the milk is at 88° F. sufficient rennet-extract is added to the milk to ensure coagulation firm enough to cut in about twenty minutes. About eight drops is usually sufficient. Another and a quicker way to add rennet-extract to the milk is to dilute 1 oz. with 3 oz. of pure water and add 6 c.c. of the mixture by means of a pipette.

(5.) When the curd is firm cut it into small pieces with the knife. A small piece of fine wire bent U shape may be used instead of the knife. The cutter must be sterilized by rinsing with hot water before placing in each sample.

(6.) Cover each tin after cutting the curd and return it to the bath. Raise the temperature of the samples to 98° F. in about thirty minutes by the addition of hot water. Shake the samples occasionally during the process. Maintain the temperature with the spirit-lamp.

(7.) When the temperature is up to 98° F., allow the samples to stand for about thirty minutes for the curd to settle. Examine each sample for flavour by smelling, and pour off all the free whey. Cover and replace the tin in the bath. Continue this at intervals of thirty to forty-five minutes for six hours. The curd may then be cut in two with a sterile knife and the condition of the curd finally noted. The best tests are done when the separation of the whey is most complete. The test may be continued from eight to twelve hours if thought desirable. The temperature during the whole of the time must be kept as near to 98° F. as possible. By careful regulation of the flame of the spirit-lamp this is not difficult.

(8.) Some indication of the purity of the sample may be gained by the odour of the whey at the first time of examination. Whey from pure milk is inoffensive to the smell; that from impure milk is objectionable. The condition of the curd, however, is the best indicator of the quality of the milk. Milk which is pure and sound will yield curd solid and free of holes and of good aroma. Milk which contains unfavourable ferments produces curds with various kinds of gas cells and odours varying in degrees of intensity. Some curds may be spongy and full of holes. Other curds may be firmer with small or pin holes. The difference between curds from sound milk and from impure milk is so marked as to make classification easy.

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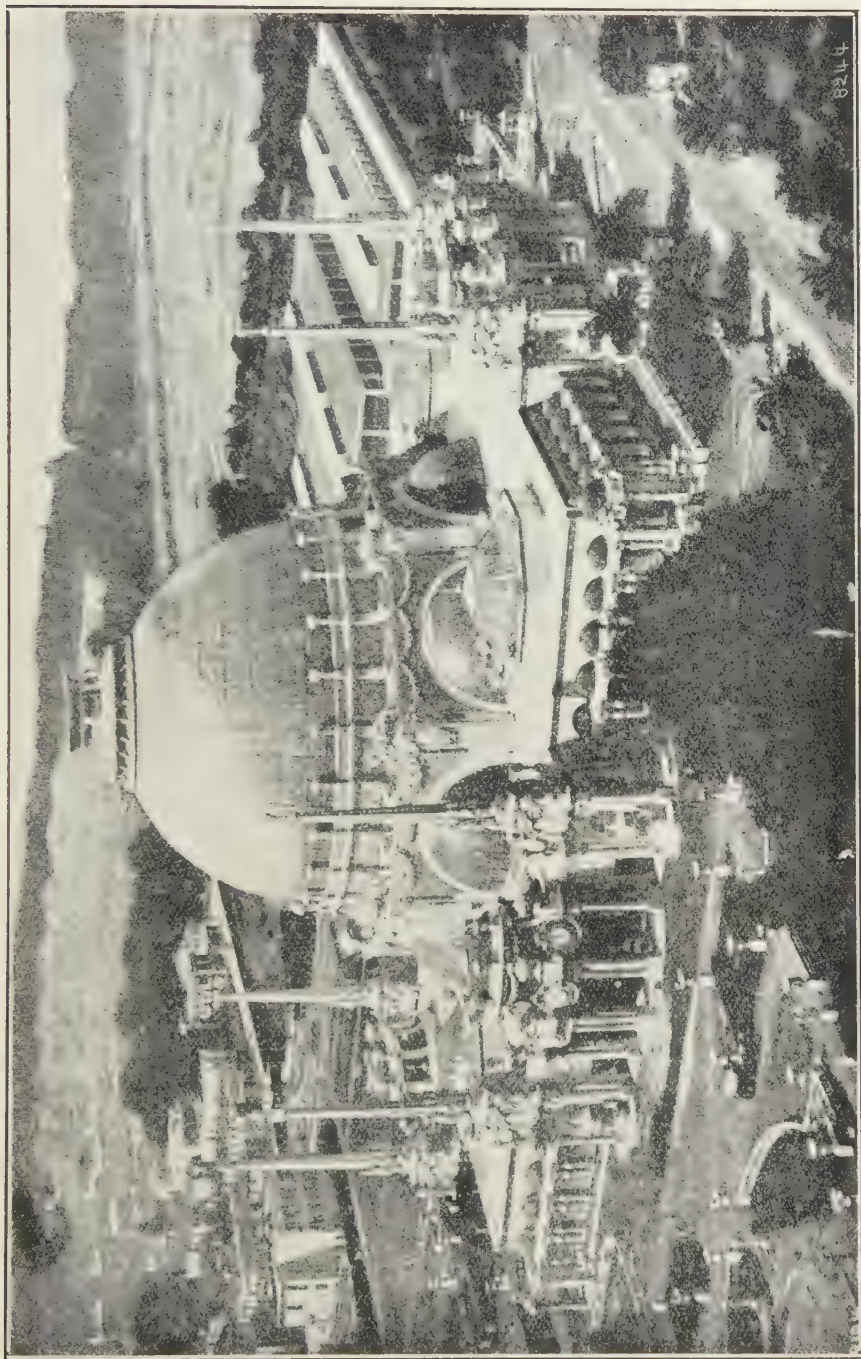
*Rugging Cows.*—In rugging cows it is well to see that the rugs are removed on warm days. The cows should be given an opportunity periodically to lick themselves and thereby keep their hides in a healthy condition.

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By means of education on agriculture, of co-operative popular banks, of young men's associations, of the consolidation of small scattered plots into larger farms, of the construction of irrigation canals and roads, we are solving in part the vexed problems of country life.—*"The Japanese Nation,"* by Professor Niazo Nitobe.

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*The Argentine Dairy Industry.*—According to the returns for 1912, just issued, over 82,000,000 gallons of milk were produced. The average price paid for this was 6½ cents per gallon, or a total of \$5,330,000. 21,818,620 lb. of butter was produced, bringing an average price of 27 cents, or a total of \$5,893,000. 12,416,416 lb. of cheese gave a value of \$1,435,000, based on 11½ cents per pound at the factory. Curded cheese, valued at \$127 per ton, produced a revenue of \$667,000.—*Canadian Farm and Dairy.*



HORTICULTURAL BUILDING AT PANAMA PACIFIC EXPOSITION.

## INFLUENCE OF POTASH ON RAPE.

T. W. LONSDALE.

New problems are continually cropping up in the world of agriculture. In recent years there has been considerable progress in the knowledge of artificial manures, and, although much information has been acquired, it is probable that in years to come we will look back to the present period as a merely transitional stage of this important subject.

When manuring a crop a fertilizer is usually employed to produce quick growth. In most cases the actual outlay or cost receives due consideration, but generally insufficient thought is given to the economic side of manuring. Often by an additional outlay of a few shillings per acre the resultant increase of a crop would more than repay the farmer for the whole of the initial expenditure.

An instructive experiment was recently carried out at the Moumahaki Experimental Farm. When sowing forage crops in December, 1912, an acre of rape was manured with 2 cwt. of superphosphate, and a similar area received 2 cwt. of superphosphate and 56 lb. of sulphate of potash.

During the early stage of growth there was no apparent difference in the plants on the respective plots, but later it was evident that potash was proving effective. This was manifested by the dark-green foliage and vigorous growth of the potash plot, while the plants which received superphosphate only appeared to lack vigour and suffered to a greater extent from the ravages of the diamond-back moth.

On the 13th March thirty-eight lambs were weighed and nineteen turned into each plot. The lambs were again weighed on the 20th March, and later on the 26th March. The table on the following page shows the cost of manure, weight of lambs throughout, and profit due to the addition of sulphate of potash.

For tabulation purpose the gain in weight of lambs is estimated at 3d. per pound.

Compared with plot 1 the gain in weight of lambs on plot 2 appears almost phenomenal.

The experiment throughout was most carefully conducted. The lambs were an even lot, and when additional stock was placed on the rape, plot 2 carried double the number grazed on plot 1,

| Number of Plot. | Manure.                                          | Cost of Manure. | Weight of Lambs. |             |             | Gain per Lamb. | Total Gain. | Value of Gain. | Value of Gain due to Additional Outlay of 8s. |
|-----------------|--------------------------------------------------|-----------------|------------------|-------------|-------------|----------------|-------------|----------------|-----------------------------------------------|
| 1912-13.        |                                                  |                 |                  |             |             |                |             |                |                                               |
|                 |                                                  |                 | 13th March.      | 20th March. | 26th March. |                |             |                |                                               |
|                 |                                                  |                 | lb.              | lb.         | lb.         | lb.            | lb.         | £ s. d.        | £ s. d.                                       |
| 1               | 2 cwt. superphosphate                            | ..              | 1,064            | 1,099       | 1,148       | 4.42           | 84          | 1 1 0          | ..                                            |
| 2               | 2 cwt. superphosphate, 56 lb sulphate of potash  | 18 0            | 1,022            | 1,120       | 1,169       | 7.74           | 147         | 1 16 9         | 0 15 9                                        |
| 1913-14.        |                                                  |                 |                  |             |             |                |             |                |                                               |
|                 |                                                  |                 | 20th Jan.        |             | 3rd Feb.    |                |             |                |                                               |
|                 |                                                  |                 | 4,886            | ..          | 5,242       | 6.03           | 356         | 4 9 0          | ..                                            |
| 1               | 2 cwt. superphosphate                            | ..              |                  | ..          |             |                |             |                |                                               |
| 2               | 2 cwt. superphosphate, 56 lb. sulphate of potash | 18 0            | 4,647            | ..          | 5,129       | 8.17           | 482         | 6 0 6          | 1 11 6                                        |

the growth on the former being much more vigorous than on the latter.

After grazing down the second time the plots were closed and allowed to remain until the following August. The effect of potash was most remarkable, plot 2 having made vigorous growth during the winter, while the plants on plot 1 appeared weakly and were running to seed.

As the result of one trial cannot be regarded as conclusive, a similar test has been conducted during the past season, and the results corroborate those of the year 1912-13.

On the 20th January, 1914, fifty-nine mixed sheep were turned into the respective plots and remained there until the 3rd February. Though the difference in gain between the plot manured with superphosphate only and the one which received sulphate of potash in addition is not so striking as in the previous trials, it must be admitted that in both instances potash has more than repaid the cost of the experiment.

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## AMERICAN MEAT-MARKETS.

### THE INCREASE IN PRICES.

E. CLIFTON.

CAN meat be sold to the ordinary consumer at the prices that are now obtaining in America and that are even likely to increase? It is claimed that the price of beef has advanced 5d. per pound since the summer of 1903, and the prices are going on increasing. Can it be that 1s. 2d. per pound is a reasonable price to pay? Already it is noted that there is a decreased consumption of beef of the poorer quality—that is to say, the people who have been in the habit of buying the medium class of beef are now feeling the restriction of the increased price, and are, as a matter of self-protection, decreasing their consumption. Sirloin steak is selling up to 1s. 3d., as against 1s. in 1903. The same applies in proportion to beef generally. Pork has increased in the last twelve months by 20 per cent. Mutton alone has not shared in the general advance. May not this be an opportunity to New Zealand to bring into notice its mutton and lamb? People here have been accustomed to their beef and to their pork, for the reason that the mutton offered them is not of the highest quality, as compared with that of New Zealand. Might there not be even a favourable opportunity of opening an

establishment, simply a retail shop, where the food products of New Zealand would be sold under their own name and at a reasonable profit? In this city at no time of the year, so far as can be discovered, is any of the New Zealand meat—beef, mutton, lamb, or veal—offered under its own name, nor is there any means of compelling the notification of the country of origin to be exhibited by the retailer. There is the other way, that of offering it definitely for sale, advertising it, and keeping it clearly before the public. It is perhaps too much to expect that the State would undertake this. It is very definite, however, that this business can be carried on at a profit. The requirements would be a regular supply from New Zealand; the control of sufficient supplies for cold storage in San Francisco, and such storage could be rented; the establishment of a shop and the restriction of sales to a reasonable price, and the entire exclusion of credit—that is, nothing would be sold excepting for cash. It is a tempting prospect, certainly, and one that would bring our New Zealand food products, both meat and dairy-produce, directly before the consumer.

One effect of the enormous increase in the price of meat will probably be that of inducing the American farmer to raise far more beef-animals. In the opinion of those controlling the meat interest in America it is probable that a further increase will take place during the present summer. The price of live cattle is naturally advancing very much. There is not now the margin or a possibility for the crude methods of fattening that have been permitted hitherto. It is observed that the farmer of the United States is already moving in the direction of establishing grazing-farms. Even those farms that had been given up in the New England States are being brought again into use for grazing. It probably will be that in the ranch country the stock will be raised and brought to the mixed farms of the more fertile districts for fattening. No farming method promises greater profit, and there is probably no more interesting branch of agriculture than that of fattening stock. They have the assurance before them that it will require many years to even up the production of meat to the requirements of the consumer. Even though every attempt may be made in that direction, there is every assurance that the price of meat will remain as high as now, even if there be not the contemplation of a still higher price in the future.

It is a curious thing that the United States and Canada ceased almost without warning to be exporting countries. Many claims are made as the reasons for this—that the larger properties are being subdivided into farms; but these farms will of necessity become to a very great extent the producers of fat stock, and the

American farmer may well be trusted to devote himself to that branch of agriculture that promises the greater profit.

The great consumption of these products is naturally in the eastern States. At present South America has this market almost under its control. This is a condition that will cease so soon as the regular shipments of meat become established through the Panama Canal, and thus afford to New Zealand and Australia direct access to the eastern States of America.

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## A NEW PLUM.

W. H. TAYLOR.

A GOOD many inquiries have been made on the Arataki Experimental Farm about the new Japanese plum *Hermosillo*, particularly as to the date of flowering and as to the truth or otherwise of the claim that it is the earliest of all plums to ripen. I am now able to answer both questions. To make the matter plainer I will give dates of flowering of some other varieties. This will show what effect this climate has on the time of flowering. Rutland Plumcote—first flowers open on the 1st August; Cherry Plum, 20th August; Rubio, Santa Rosa, Ballena, Madeira, all on the 24th August; Lord Kitchener, 26th August; *Hermosillo*, 5th September, at which date many European varieties were beginning to open.

*Hermosillo* is said to mean "little beauty." The name is certainly very appropriate. The fruit is more than double the size of a cherry-plum, but still small, perfectly round, and deep red in colour. The flavour when ripened on the tree is distinctly good, making a good dessert fruit, sweet and refreshing. When I say that the fruit was perfectly ripe on the tree on the 12th December its earliness and value will be at once recognized. It was ripe two weeks before any other plum.

It may be of value to call to mind a recommendation that came with the Japanese plums when they were first introduced—viz., that, owing to their having tough skins, they will travel in cases when quite ripe. This does not apply to quite all the varieties, but it does to most of them. Yet they are usually packed quite green, and very worthless most of them are after that treatment. I think there is room for experimental packing in this connection.

## TOMATO-CULTURE.

### GLASSHOUSE AND OUT-OF-DOOR EXPERIMENTS AT THE LOWER HUTT.

T. C. WEBB, Jun.

FURTHER experiments in tomato-culture and disease-control have been conducted in Mr. Hobbs's glasshouse, Lower Hutt, by the Department in co-operation with the Hutt Tomato-growers' Association.

On the 2nd June, 1913, all the old soil to a depth of 15 in. was removed from the house, and the remainder sprayed with a 2-per-cent. solution of carbolic acid. The old soil was replaced by fresh loamy turf which had not been used for cropping purposes for a number of years.

*Plant-propagation.*—The seed was secured from selected plants raised by Mr. J. Brassel, Lower Hutt. Before planting the seed the soil was sterilized at a temperature of 210° F. Four boxes of soil were prepared, two containing simply sterilized soil, while two had a small layer of stable manure at the bottom. The difference in the growth of the plants in the four boxes was very little. The sterilization of the soil was carried out to prevent eelworm. This is an excellent idea. All growers are recommended to sterilize their soil, as by this process all living germs are destroyed. The plants will be a little slow at first, but after a while they soon become sturdy and healthy. They do not love to push their way through weeds and grass, as is sometimes the case in unsterilized soil. They will also stand the pricking-out, transplanting, and recovery better than others. Many growers crowd their boxes, with the result that the plants become long and spindly. The more room provided the healthier and stronger the plants. The total number of plants set out was 349.

*Cultivation.*—The soil was constantly worked up and kept in good order.

*Watering.*—This was carried out after midday, usually at 3 p.m. The house did not receive water daily, as the house is inclined to be rather damp. Letters have come to hand inquiring as to the best method of watering, and what quantity to use. This all depends on the house. If you have a tomato-house that receives

plenty of sun, then water freely. Mistakes are often made by pricking out plants that are dry at the roots—this leads to the plants suffering from drought; or else much water is applied to remoisten them, with the result that the new soil about them becomes saturated and soured, causing the plants to droop, involving a lot of attention, in spite of which the plants are set back considerably. Until such time as the plants have become established in the new soil water should be applied sparingly, keeping the old ball of soil round the roots slightly moist. Eventually water may be applied freely and with advantage.

*Ventilation.*—Only top and fanlight ventilators were used. I think the idea of bottom ventilation is quite abolished in the Hutt district.

*Temperature.*—The temperature ranged from 48° to 92°. Changes in the weather were many, and the ventilators could not possibly receive all the attention required, as Mr. Hobbs and myself were occasionally away. As this is a most important detail in tomato-culture, growers should pay more attention to it than is generally the case. High temperature, if accompanied by much moisture in the air, promotes a weak growth, fruit fails to set, and disease will be prevalent. The average temperature should be about 80°. This is no doubt a good working-temperature, but is somewhat hard to keep, especially where the weather-conditions are changeable. The climatic conditions vary so much in different districts that it would be useless to quote a fixed temperature—that is, of course, where no heating-apparatus is used.

*Humidity.*—Lloyd's hydrodeik was again used to test the moisture in the atmosphere of the house. The range was wide—namely, 50° to 93°, the average being 82.3°. This was greater than the temperature, giving a fair idea of the dampness in the house. Notwithstanding this the crop was fair, although a quantity of the fruit did not set. Testing for humidity is of great importance to the grower. Like my fellow-officer, Mr. Reid, I am satisfied that humidity above 70° is unsatisfactory. With this, one will find that a satisfactory atmosphere is being maintained, and that the pollen will distribute readily towards midday.

*Spraying.*—Spraying with the Bordeaux mixture, 3-5-50, was continued soon after the plants were set out. This strength was used every fortnight up to the time when spot first appeared, then 4-5-50 was substituted. Growers often suggest that Bordeaux mixture is inclined to check the growth of the plant. No doubt this may be true temporarily, but my advice is to spray as soon as the first two leaves show on the young plants. It will not injure the plants, and the slight check will hardly be noticed.

Attention must be again drawn to the use of lime for spraying purposes. Large quantities of lime, looking like cakes of oatmeal, are on the market for sale. This stuff is of no use, as one cannot get the right quantity of lime when weighing, and it takes longer to slake. Use only fresh roche-lime. Good lime cannot be broken in the hand. If good lime is not procurable, then soda Bordeaux should be used so as not to leave the plants without protection. Soda Bordeaux mixture is made up as follows: 4 lb. sulphate of copper, 5 lb. washing-soda, and 50 gallons water. Careful spraying in a large well-found house will keep down the disease. This is undoubted; but a tomato-house should be used for tomatoes only, as disease is very easily spread by having other vegetation in the house. For instance, a grower asked me to call and see his house. On arrival I found it was a vinehouse with tomatoes in the centre, and on the sides were lined rows of lettuce. The tomatoes were badly attacked with green aphid, causing the leaves to crumple and twist up, thus checking growth. Kerosene was tried, with good results, but on examination the lettuce was found to be covered with the aphid. The vines were also attacked. To spray the lettuce was impossible, and it was only after they were removed that the pest could be controlled.

#### *Diseases.*

*Tomato Leaf-spot (Cladosporium fulvum).*—This disease was held in check up till the time when the plants were about 5 ft. high, then rough weather prevailed for two weeks, and the dampness of the house soon induced spot. This was first noticed on the shaded side. Bordeaux mixture, 4-5-40, was used, and kept the outbreak in check, although it appeared again in bad weather, and it was necessary to use the mixture once a week, instead of once a fortnight, for two weeks.

*Eelworm (Heterodera radiculicola).*—Last year, when the soil was not renewed, this pest appeared on practically every plant, causing large knots or galls on the roots. This year, the old soil having been removed and fresh soil substituted, there were only three or four plants slightly affected. Sterilizing the soil for seed-boxes and the removal of infected soil is the best method of control that can be recommended at present. "Matadoleo" was tried for eelworm, but this mixture will have to be tried again before a definite report on the results can be given.

*White Fly (Aleurodes nubifera).*—This fly caused some damage last year, but was easily eradicated by the use of MacDougall's fumers. This year there was very little sign of this pest.

PLAN OF HOUSE, SHOWING THE DIFFERENT MANURES USED IN EACH PLOT.

| 4.                                                                                     | 3.                                                                                   | 2.                                                                  | 1.                                            |        |
|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------|--------|
| Five rows sulphate of potash and bone-dust, half and half; rate, 5 cwt. per acre.      | Six rows Gear's garden manure; rate, 5 cwt. per acre.                                | Nine rows blood and bone mixed; rate, 5 cwt. per acre.              | Eight rows basic slag; rate, 8 cwt. per acre. | RIGHT. |
| DOOR. P A T H. DOOR.                                                                   |                                                                                      |                                                                     |                                               |        |
| Six rows superphosphate and sulphate of ammonia, half and half; rate, 5 cwt. per acre. | Nine rows island guano and flowers of sulphur, half and half; rate, 8 cwt. per acre. | Six rows superphosphate and nitrate of soda; rate, 8 cwt. per acre. | No manure.                                    | LEFT.  |
| 5.                                                                                     | 6.                                                                                   | 7.                                                                  | 8.                                            |        |

*Manures.*

By referring to the above plan it will be seen that several mixtures of manures were tried. These were applied on the first signs of fruiting and lightly raked into the soil. The results are as follow :—

Plot No. 1 : This mixture again this year showed the largest return of fruit on the lower trusses. It is a good manure, but I should recommend a little superphosphate and sulphate of ammonia to be applied three weeks later to assist the swelling of the fruit and the development of the top trusses.

Plot No. 2 : A fair supply of fruit ; plants healthy and strong. Sulphate of ammonia applied three weeks later would increase the yield.

Plot No. 3 : Yield fair ; plants strong. This manure appears to be better suited for outdoor-grown tomatoes.

Plot No. 4 : Plants long and weak ; fruit poor.

Plot No. 5 : Rather too much growth ; fruit fair, showing colour quickly.

Plot No. 6 : Poor throughout ; insufficient manure. The sulphur was used as a test for the control of disease. The result was unsatisfactory.

Plot No. 7 : Plants sturdy ; fruit fair—showed colour quickly. The addition of a little sulphate of ammonia would improve the mixture.

Plot No. 8 : Plants long and spindly ; fruit very poor.

*Remarks.*

The yield throughout was not up to expectations, although it was second to the largest ever taken out of the house. As before stated, a large quantity of fruit did not set. This was due to

the dampness of the house, caused by the shelter around it and a large vine running through the centre, which blocked out a good deal of light. Referring once more to ventilators, I may say that growers are often misled. The control of ventilation is most important, as before stated. In the morning, air should be introduced into the house in small quantity—that is, if the day promises to be fine. In the afternoon the ventilators should be closed gradually before the temperature has dropped.

#### *Conclusion.*

In conclusion, I wish to thank Mr. Hobbs for his very kind assistance throughout, but regret that his other duties prevented him from weighing the fruit from each plot as gathered. The fruit was weighed from each side of the house only. On the left side, which is sheltered and damp, the plants produced 336 lb. of fruit, while from the right side of the house 937 lb. of fruit was gathered, giving a total of 1,273 lb. of fruit. The return for the fruit sold was £27 7s. 10d. The cost of manures was 3s. 6d., and the cost of spraying-material 4s.: total expenditure, 7s. 6d.; net return, £27 0s. 4d.

#### EXPERIMENTS WITH TOMATOES GROWN OUT-OF-DOORS.

Experiments with outdoor-grown tomatoes for the purpose of ascertaining how little manure could be used without reducing the returns, also tests with the Bordeaux mixture for the control of fungus diseases, were conducted by Mr. J. Brassel, Waterloo Road, Lower Hutt, in co-operation with the Orchards Division of the Department. Prior to winter ploughing, the whole of the area to be planted received a dressing at the rate of 3 tons of lime to the acre. This was ploughed in, and the land was well worked.

#### *Cultivation.*

Early in November the drills were opened out with the banker and filled in with the scarifier. The plants were then set out in the drills, cultivation between the drills being carried out with the horse-scarifier up to the time when the first wire was put up; afterwards the hand Planet cultivator for the land between the rows, and the push-hoe between the plants. The plants were trained along the wires on the two-stem system.

Plot No. 1 consisted of fifteen rows of 150 plants to the row. This plot received before planting 2 cwt. of sulphate of iron and  $2\frac{1}{4}$  cwt. of sulphate of potash. At the time of planting, the first week in November, the soil received a dressing at the rate of

8 cwt. of garden manure per acre; on the 8th January, 8 cwt. of garden manure per acre; on the 1st March, 8 cwt. of a mixture of superphosphate, nitrate of soda, and sulphate of ammonia.

Plot No. 2 consisted of seven rows of 150 plants to the row. By the 8th January, 1914, the plants had developed their first trusses of fruit, and the rows were manured with  $9\frac{1}{2}$  lb. superphosphate, 4 lb. sulphate of ammonia, and 2 lb. nitrate of soda, giving a total quantity of  $15\frac{1}{2}$  lb. to the row, or at the rate of 8 cwt. per acre.

Plot No. 3 consisted of eight rows of 150 plants each. On the setting of the first trusses of fruit, a dressing of  $9\frac{1}{2}$  lb. superphosphate, 2 lb. sulphate of ammonia, 4 lb. sulphate of potash, and 2 lb. nitrate of soda was applied, being a total quantity of  $17\frac{1}{2}$  lb. per row, or at the rate of 9 cwt. per acre.

#### *Results.*

Plot No. 1, of fifteen rows: The tomatoes were large and the crop heavy, giving a yield of 559 cases of marketable fruit. Owing to cold weather setting in early, a proportion of the crop did not ripen. Cost of manures, £6 7s. 6d.

Plot No. 2, of seven rows, which received only one dressing of manure, gave good results, proving better than No. 3. With the earlier application of the manure this plot would have given even better results. Yield, 266 cases of fruit. Cost of manures, 3s. 9d.

Plot No. 3, of eight rows: The result was fair. The quantity of manure used was insufficient, while the addition of the potash proved valueless. Yield, 215 cases of fruit. Cost of manures, 4s. 5d.

#### *Plants.*

The plants were raised from carefully selected seed in soil sterilized by heat. They were pricked out in the usual way, and transferred to the cooling-frames. It is worthy of note that they were thoroughly sprayed twice with the Bordeaux mixture—4 lb. lime, 4 lb. sulphate of copper, 40 gallons water—while still in the boxes—that is, before being set out in the open.

#### *Spraying for Pests and Diseases.*

After being transplanted from the boxes to the rows the plants were sprayed once a fortnight with the Bordeaux mixture at the strength mentioned above. Over the greater portion of the area planted, fungus disease was easily kept under control; but on one part, owing to lack of labour and to bad weather, Irish blight

secured a fairly firm hold. It then became a question of either rooting out the plants affected or adopting some other method of treatment. Mr. Brassel decided to strip off the affected leaves as far as possible and spray thoroughly with Bordeaux mixture. The result thoroughly justified this decision, for the plants almost entirely recovered from the attack and carried almost a full crop. The attention of tomato-growers is drawn to the fact that even after fungus disease, such as Irish blight, has secured a fairly firm hold it may be brought under control by careful and thorough spraying with Bordeaux mixture. In too many instances when the appearance of disease has been noticed, growers have been inclined to consider that any further attempt at control is useless. The result achieved by Mr. Brassel should entirely dispose of this idea.

*Caterpillar.*—For the control of insect pests, and especially the tomato-caterpillar, which often causes serious loss in the case of outdoor-grown tomatoes, Swift's arsenate of lead was used in conjunction with Bordeaux mixture, at the rate of  $1\frac{1}{4}$  lb. to 40 gallons. As a result, possibly not more than half a dozen tomatoes were attacked throughout the whole season. Other brands of arsenate of lead used previously proved far less effective for the control of this pest. Mr. Brassel states that he is quite convinced, as a result of the experiments carried out by the Department, that Irish blight can be controlled without difficulty by careful and systematic spraying with the Bordeaux mixture.

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*Soya Bean.*—There is need for the more extensive testing of the Soya bean. Small quantities of seed and inoculated soil will be supplied from the Moumahaki Experimental Farm to a limited number of farmers who will undertake to record the effect of inoculation. The Soya bean is hardier than the cow-pea, and is most desirable for fodder and for soil-treatment.—*Fields and Experimental Farms Division.*

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*Lucerne.*—The growth of lucerne would appear to depend to a large extent upon the origin of the seed. Those varieties which have been raised under severe climatic conditions exhibit a long dormant period during the winter months: such varieties include Dryland, Hungarian, and Provence. Those varieties which have been raised under warmer climatic conditions grow exceedingly well during the winter months: such varieties are Peruvian and Arabian. For general excellence for both winter and summer growth the Marlborough and Hunter River varieties are as yet unsurpassed at Moumahaki Experimental Farm.—*T. W. Lonsdale.*

## IMPROVED METHODS OF DRESSING PHORMIUM FIBRE.

### COMPETITION FOR THE GOVERNMENT BONUS.

#### REPORT OF INVESTIGATING COMMITTEE.

THE £12,000 bonus offered by the New Zealand Government for an improved method of dressing phormium-fibre has been competed for by inventors from all parts of the world, and the investigation Committee has completed its work. Following is the complete report of the Committee :—

#### THE REPORT.

The Commissioners duly appointed to adjudicate on the various improvements in connection with the Government bonus as notified by the Hon. the Minister of Agriculture in his circular of the 22nd September, 1911, have the honour to submit their report.

The several applicants were,—

1. H. J. Boeken, Palmerston North : No paddocking, no tow ; use up by-products.
2. George Craw, Linton : Stripper-slips process only.
3. Clayton and Maude, Christchurch : No paddocking, no scutching ; have also invented new washer ; little washing required.
4. Tait and Co., Dunedin : Flax-dressing machine (no particulars).
5. J. Pierre Morine, Kutarere, Bay of Plenty : Flax-dressing machine (no particulars).
6. F. Evans, Auckland : Strips, washes, and dries in one process.
7. G. C. Entwistle, Tuakau : Washing-machine.
8. Suttie and Wynyard, Auckland : Various patents.
9. T. R. Gillman, sen., and Son, Onehunga : Flax-dressing machine ; no bleaching.
10. T. H. Smith, Paengaroa : Artificial dressing ; no paddocking.
11. H. Travers Twiss, Stratford : No stripping, paddocking, scutching.
12. Maddren Bros., Christchurch : No paddocking.
13. F. Henry, Collingwood, Invercargill : Flax-dressing machine (no particulars).
14. A. A. Carson, Kilbirnie : No paddocking.
15. A. J. Whiteside, Raupo, Northern Wairoa : New stripper, scutcher, &c. ; run mill with two men.
16. W. Earnshaw, Watson Street, Wellington : Flax-dressing machine (no particulars).
17. A Hunter, Westport : Withdrawn.
18. W. F. Marsh, care Post-office, Christchurch : New process, using same mill and machinery in present use.

19. Robinson and Wanklin, Foxton : Tail-clipping machine.
20. H. B. Murphy, Elsternwick, Victoria : No paddocking ; very little scutching ; improved colour and strength.
21. C. A. Monticone and Co., Sydney : No particulars yet.
22. Robert Jutz, care Dr. Trant, Drouin, Victoria : Chemical process.
23. Antonio Teresa, Philadelphia : No washing or scutching.
24. A. P. O'Brien, New York : Flax-dressing machine ; no washing or paddocking.
25. L. Schlick, Toronto.
26. W. A. Mather, Manchester : Eliminates present method of stripping, paddocking, and scutching.
27. W. E. Brown, care of A.M.P. Society, 37 Threadneedle Street, London : Flax-dressing machine (no particulars).
28. W. J. Vincent, Cardiff : Flax-dressing machine (no particulars).
29. P. B. Domone, Islington, London : No particulars.
30. Ritterhaus and Blecher, Barmen : No paddocking ; utilization of by-products.
31. The World's Fibre-manufacturing Corporation (Limited), London (T. Milne, representative) : Flax-dressing machine.
32. Dr. L. C. Maquart, Buel-a-Rhein : No particulars yet.
33. George Leuchs, Nuremburg : Chemical process.

#### PHORMIUM TENAX.

*Report of the Commissioners appointed to examine the Machines and Processes submitted in Competition for the Bonus of £12,000 offered by the New Zealand Government for the Encouragement of the New Zealand Hemp Industry.*

1. H. J. BOEKEN : On the 15th July the Commissioners proceeded to Island Bay to inspect an automatic scutcher, but as the machine was only partly completed the applicant was unable to give a practical demonstration. On the 17th July the Commissioners inspected at Tokomaru the patent elevator, stripper, washer, and waste-product machines of the same applicant. As only a partial demonstration was given, the Commissioners did not see anything that warranted them coming to a definite opinion on the merits of the machine.

2. GEORGE CRAW, Linton : On the 17th July the Commissioners were given a practical demonstration of the patent stripper-slips machine. This machine undoubtedly does its work well, but the Commissioners are of the opinion that stripper-slips are really a form of waste which should be eliminated from the industry. The combined machine improves the colour of the stripper-slips, and afterwards turns them into marketable tow. The price asked for this machine is £10 plus actual cost of installation for each stripper in use. The Commissioners recommend that the applicant be granted the sum of £100.

3. CLAYTON AND MAUDE, Christchurch : On the 10th June the Commissioners proceeded to Woolston to inspect the patent of these applicants. The demonstration was not a practical one, and from what the Commissioners saw they have no recommendation to make, as they were not given any indication that the machine would effect the improvements which the patentees claim.

4. TAIT AND CO., Dunedin : The Commissioners visited these applicants' machine on the 13th June. This machine is of a very complicated

nature, and it appears to be the desire of the inventors to treat the fibre mechanically from the commencement to the finished article. The demonstration given to the Commissioners was unsatisfactory, and would not warrant them in making any recommendation.

5. J. PIERRE MORINE, Kutarere : On the 26th June the Commissioners inspected a wooden model, but from the crude attempt given at a demonstration the Commissioners consider that the machine could not be put to any practical use.

6. F. EVANS, Auckland : Application withdrawn.

7. G. C. ENTWISTLE, Tuakau : On the 24th June the Commissioners were given a practical demonstration of a patent washing-machine. This is a simple and effective machine, but in the absence of an automatic catcher the Commissioners are of the opinion that the washer as shown is not any improvement on the present method.

8. SUTTIE AND WYNWARD, Auckland : On the 19th-20th June, 1914, the Commissioners proceeded to Onehunga to inspect—No. 1, flax-sorting machine ; No. 2, bench-loader and deliverer ; No. 3, automatic bench-loader and automatic feeder ; No. 4, machine for cleaning drain ; No. 6, apparatus for automatically conveying washed fibre into paddocks ; No. 7, automatic drying-machine ; No. 9, tow-saving machine. As none of the above machines were ready for inspection, no demonstration was given. Nos. 5 and 10 : Only a partial demonstration was given, and from what the Commissioners saw they are not in a position to make any recommendation. No. 8 : Automatic scutcher, was inspected at Foxton on the 8th July. This is a very ingenious and well-constructed machine, and, although open to improvement, the Commissioners are of the opinion that this is a great improvement on the present method. The scutcher as at present working at Foxton is putting through a quantity of scutcher hemp per day in excess of the present machine. The cost of the machine is approximately £300 installed, and the royalty is 3s. 6d. per ton for each ton of hemp scutched. The Commissioners recommend that the patentees be awarded the sum of £750, provided that the rate of royalty is reduced from 3s. 6d. to 2s. per ton.

9. T. R. GILLMAN, SEN., AND SON, Onehunga : The Commissioners inspected the chemical process of these applicants on the 19th June, and they are of the opinion that this would be of no commercial benefit. They have no recommendation to make.

10. T. H. SMITH, Paengaroa, was visited on the 27th June. No practical demonstration was given.

11. H. TRAVERS TWISS, Stratford : Application withdrawn.

12. MADDREN BROS., Winchester, were visited on the 10th June. A practical demonstration was given, but the Commissioners consider that the process as demonstrated would be of no material benefit to the industry, and they have no recommendation to make.

13. F. HENRY, Collingwood, Invercargill, was visited on the 12th June. No practical demonstration was given ; no recommendation to make.

14. A. A. CARSON, Kilbirnie, was visited on the 8th July. The Commissioners consider the process adopted would be of no benefit to the industry.

15. A. J. WHITESIDE, Raupo, was visited on the 22nd June. The machine broke down, and no practical demonstration was given. No recommendation to make.

16. W. EARNSHAW, Wellington, was visited on the 17th June. Whilst demonstrating the machine broke down. This is a new form of stripper with an adjustable beating-bar. The Commissioners are not in a position to make any recommendation.

17. A. HUNTER, Westport: Withdrawn.

18. W. F. MARSH, Christchurch: No demonstration.

19. ROBINSON AND WANKLYN, Foxton: Tail-clipping machine. Visited on the 8th July. This is a very simple and effective contrivance, and easily installed. The price installed is £30, and free of all royalty. The Commissioners recommend that the patentees be awarded £150 bonus.

20. H. B. MURPHY, Waikanae, was visited on the 16th July. This is a process for washing and softening the tails, and is, in the opinion of the Commissioners, a machine which gives great promise of being a benefit to the industry. A practical demonstration was given, and the resultant fibre was most satisfactory. The Commissioners recommend that the patentee receive the sum of £500 to enable him to perfect his machine.

21. C. A. MONTICONE, Sydney: No demonstration.

22. ROBERT JUTZ, Drouin, was visited on the 17th July. This process is for paper-pupling, and, in the opinion of the Commissioners, outside the scope of this bonus. No recommendation to make.

23. ANTONIO TERESA, Philadelphia: No demonstration.

24. A. P. O'BRIEN, New York: No demonstration.

25. LEO SCHLICK, Toronto: No demonstration.

26. W. A. MATHER, Manchester: No demonstration.

27. W. E. BROWN, London: No demonstration.

28. W. J. VINCENT, Cardiff: No demonstration.

29. P. B. DOMONE, London, was visited by the Commissioners on the 18th July in Palmerston North. A chemical and mechanical process. Demonstration incomplete.

30. RITTERHAUS AND BLECHER, Barmen: No demonstration.

31. WORLD'S FIBRE-MANUFACTURING CORPORATION (LIMITED), London: A flax-dressing machine. A demonstration was given at Kai-ranga on the 17th June. A beautifully constructed machine, but, in the opinion of the Commissioners, not suitable for New Zealand flax.

32. DR. L. C. MAQUART, B nel: No demonstration.

33. GEORGE LEUCHS, Nuremburg: A chemical process, but, in the opinion of the Commissioners, it would not be of any benefit to the industry.

On the 7th May the Commissioners commenced their duties, and on the 9th June they started on the various investigations, which were only concluded on the 21st July. The Commissioners considered that it would be inconvenient to give demonstrations at only one centre, and accordingly arranged for the various machines and processes to be inspected in the locality selected by the patentees. Consequently, inspections were made as far north as Dargaville and as far south as Invercargill. They found that although the time for the receipt of applications for the bonus was extended until the 30th November, 1913,

in most cases the applicants were not ready on the dates fixed for the inspection, notwithstanding that the first demonstration was not made until seven months after the date of closing. In many instances the applicants desired an extension of time. Although the Commissioners inspected all that so desired, they are of the opinion that a few are worthy of further investigation; and they have the honour to recommend that, from the present applicants, the following be granted an opportunity to give another demonstration:—

H. J. Boeken, scutcher.

Suttie and Wynyard, various machines.

G. C. Entwistle, washing-machine, with catcher.

T. H. Smith, artificial dressing.

Maddren Bros., improved washing-machine.

W. Earnshaw, flax-dressing machine.

H. B. Murphy, improved washing-machine.

P. B. Domone, chemical and mechanical process.

Various chemical processes were submitted for inspection, but the Commissioners regret that the fibre so treated was not equal to that produced under existing conditions.

Of the several mechanical flax-dressing machines inspected, the Commissioners regret that none are capable of displacing the present method of stripping. All stripping-machines shown were an adaptation of the present stripper. One method of decorticating was in one case used by a series of needles. The Commissioners desire to especially report on the splendid mechanism of this machine, and regret that they found the machine unable to cope with the peculiarities of *Phormium tenax*. Several different types of washing-machines were inspected—some of very original design and construction, and possessed of good qualities, such as simplicity and efficiency, no waste by stripper-slips, and complete cleaning of the tails. Several scutchers were submitted for inspection, but in most cases the machines were unfinished. However, sufficient was shown to prove that the principle of automatic scutching was solved.

The Commissioners desire to express their strong disapproval of the principle adopted by many of the applicants in stipulating for royalties in addition to a high price for the machines. They would also respectfully suggest to the favourable consideration of the Government that the bonuses should be reinstated for another period of eighteen months, so as to enable inventors to perfect their patents, and also to give others and oversea competitors an opportunity of making useful machines for competition under the reinstated bonus.

The Commissioners desire to express their appreciation of the assistance rendered to them by the gentlemen representing the Government—viz., Mr. Robert Duncan, Inspector of Machinery; Mr. William H. Ferris, Chief Hemp-grader; Mr. W. H. O. Johnston, Hemp-grader. But for this assistance the labours of the Commission would have been much more arduous.

We are, &c.,

E. L. BROAD.

WM. ROSS.

A. A. BROWN.

C. W. INGRAM.

HUGH AKERS.

JOSEPH LIGGINS.

## SEMI-OFFICIAL TESTING.

W. M. SINGLETON.

SEPTEMBER has given us quite a number of calvings amongst the semi-official-test cows, and the good records we have been able to publish in the past few months are being added to every day. We have the records of sixty-nine cows to publish this month, and once again the displacement of certain of the class leaders.

In the four-year-old Jersey class Ivy's Riotress, belonging to Mr. E. Griffiths, of New Plymouth, takes pride of place with 435·67 lb. fat produced in 344 days. She displaces Messrs. A. and J. O'Donnell's Queen Marjorie II, which gave 430·71 lb. fat in 349 days.

In the two-year-old Holstein-Friesian class Pietertje Lassie of Cliffside, belonging to Mr. W. I. Lovelock, of Palmerston North, displaces Mr. J. Deacon's Butter-girl. Mr. Lovelock's heifer has done very fine work as a first calver, and her record of 597·28 lb. fat for 365 days sets a high standard for her class.

Last month we published a new leader in the four-year-old Holstein-Friesian class in Mr. A. J. Gallichan's Diamond. This cow has in her turn been displaced by two cows. Stella, belonging to Mr. G. Aitchison, of Kaitangata, has given 523·81 lb. fat in 315 days; and Mr. W. H. Bayliss, of Mangatainoka, has a cow, Annette V of Brundee, which again exceeds this record: she gave in 330 days 545·3 lb. fat.

Amongst the Ayrshires two only have calved in the month, and both cows go to the head of their respective classes. Miss Russell, belonging to Messrs. Weir Bros., of Pukehiki, is the present leader of the two-year-old class with 365·84 lb. fat produced in 340 days.

In the four-year-old class Posy of Cambridge, belonging to Messrs. J. and C. Watt, of Cambridge, gave 406·91 lb. fat in 320 days. She displaces Dark Stately, belonging to Mr. C. E. C. Webb, of Koputaroa, the record of which we published last month.

## JERSEYS.

| Name of Cow.                 | Name and Address of Owner.     | Age at starting Test. | Fat req'd. Cert. | Yield for Season. |          |        |
|------------------------------|--------------------------------|-----------------------|------------------|-------------------|----------|--------|
|                              |                                |                       |                  | Days.             | Milk.    | Fat.   |
| <i>Two-year-old Class.</i>   |                                |                       |                  |                   |          |        |
| Friskey Goldie ..            | Dr. F. J. Watson, Bull's       | 1 359                 | 240·5            | 365               | 7983·40  | 442·02 |
| Sybil See ..                 | Mrs. A. Banks and Son, Kiwitea | 2 318                 | 272·3            | 349               | 8660·85  | 409·30 |
| Sweet Choice ..              | D. H. Kilgour, Kiwitea         | 1 330                 | 240·5            | 330               | 6459·90  | 369·63 |
| Rose's Pet ..                | T. Foreman, Alton ..           | 2 310                 | 271·5            | 365               | 6072·15  | 356·31 |
| Miss Rita ..                 | R. J. Linn, Normanby           | 2 362                 | 276·7            | 334               | 6067·00  | 350·16 |
| Lady Surprise ..             | T. Foreman, Alton ..           | 2 11                  | 241·6            | 332               | 5213·65  | 307·40 |
| Sweet Carnation ..           | R. J. Linn, Normanby           | 2 277                 | 268·2            | 365               | 5803·10  | 304·99 |
| Free ..                      | Mrs. A. Banks and Son, Kiwitea | 2 46                  | 245·1            | 332               | 5673·40  | 301·60 |
| Enchantress of Bull's        | Dr. F. J. Watson, Bull's       | 2 328                 | 273·3            | 332               | 4773·40  | 291·46 |
| Eminent's Christabel         | Mrs. A. Banks and Son, Kiwitea | 2 35                  | 244·0            | 316               | 5187·25  | 286·31 |
| Oakland's Crocus ..          | W. V. Harkness, Tariki         | 2 194                 | 259·9            | 223               | 4424·00  | 274·31 |
| Zenith's Girl ..             | H. C. Sampson, Hillsborough    | 2 31                  | 243·6            | 218               | 4617·70  | 272·21 |
| Trethella's Cherry Ripe      | J. D. Brown, Ohau ..           | 2 34                  | 243·9            | 305               | 5697·00  | 271·13 |
| Alma of Bull's ..            | Dr. F. J. Watson, Bull's       | 2 32                  | 243·7            | 356               | 4320·20  | 249·01 |
| <i>Three-year-old Class.</i> |                                |                       |                  |                   |          |        |
| Magnet's Peggy ..            | E. Griffiths, N. Ply'mth       | 3 295                 | 306·5            | 315               | 7449·00  | 453·85 |
| Frivolous Magnet ..          | J. D. Brown, Ohau ..           | 3 338                 | 310·8            | 360               | 7737·00  | 389·68 |
| Little Champ ..              | E. S. Lancaster, Levin         | 3 34                  | 280·4            | 293               | 8754·20  | 366·75 |
| Trethella's Golden Light     | J. D. Brown, Ohau ..           | 3 20                  | 279·0            | 326               | 6000·00  | 343·27 |
| Agnes ..                     | J. Pill, Hawera ..             | 3 232                 | 300·2            | 301               | 6211·00  | 338·78 |
| Queen's Fair Maid ..         | E. Hodges, Waimana             | 3 319                 | 308·9            | 345               | 7781·90  | 322·60 |
| <i>Four-year-old Class.</i>  |                                |                       |                  |                   |          |        |
| Ivy's Riotress ..            | E. Griffiths, N. Plym'th       | 4 0                   | 313·5            | 344               | 7676·30  | 435·67 |
| Brighteyes III ..            | J. T. Batey, Waitara           | 4 246                 | 338·1            | 271               | 6551·50  | 361·08 |
| Campanile's Rose Queen       | R. J. Linn, Normanby           | 4 357                 | 349·2            | 304               | 6796·50  | 352·76 |
| Maggie II ..                 | Mrs. A. Banks and Son, Kiwitea | 4 14                  | 314·9            | 338               | 7439·20  | 347·25 |
| <i>Five-year-old Class.</i>  |                                |                       |                  |                   |          |        |
| Bilberry VI ..               | E. Eagle, jun., Belvedere      | 5 300                 | 350·0            | 341               | 10119·00 | 519·48 |
| Queen of Meadows ..          | H. E. B. Watson, Tai Tapu      | 6 317                 | 350·0            | 345               | 10680·90 | 511·86 |
| Estelle ..                   | C. G. C. Dermer, Wai-piko      | 9 287                 | 350·0            | 365               | 9925·50  | 496·85 |
| Floss III ..                 | Mrs. Banks and Son, Kiwitea    | 10 343                | 350·0            | 309               | 10259·25 | 476·56 |
| Briar Rose ..                | R. J. Linn, Normanby           | 7 308                 | 350·0            | 334               | 8432·00  | 464·14 |
| Sweet Velvet ..              | " "                            | 6 226                 | 350·0            | 350               | 8432·00  | 456·19 |
| Ala ..                       | C. Stevens, Maungata-pere      | 7 17                  | 350·0            | 362               | 7131·00  | 444·67 |
| Little Lady Beatrice         | A. and J. O'Donnell, Inaha     | 6 229                 | 350·0            | 358               | 8265·10  | 427·01 |
| Marguerite II ..             | P. Roselli, Westport           | 7 11                  | 350·0            | 258               | 6573·20  | 358·56 |
| Calliopsis ..                | C. Stevens, Maungata-pere      | 6 315                 | 350·0            | 362               | 6618·00  | 353·99 |
| Bubbles ..                   | J. Mischewski, Midhurst        | 6 203                 | 350·0            | 314               | 6358·40  | 351·67 |



IVY'S RIOTRESS.  
Mr. F. Grimble's nine-year-old Jersey cow.

## HOLSTEINS.

| Name of Cow.                           | Name and Address of Owner.       | Age at starting Test. | Fat req'd. Cert. | Yield for Season. |          |        |
|----------------------------------------|----------------------------------|-----------------------|------------------|-------------------|----------|--------|
|                                        |                                  |                       |                  | Days.             | Milk.    | Fat.   |
| <i>Two-year-old Class.</i>             |                                  |                       |                  |                   |          |        |
| Pietertje Lassie of Cliffside          | W. I. Lovelock, Palmerston North | 2 297                 | 270.2            | 365               | 16771.60 | 597.28 |
| Caroline Paul ..                       | J. Liggins, Tokomaru             | 2 355                 | 276.0            | 287               | 10146.00 | 402.85 |
| Cinderella .. ..                       | W. H. Bayliss, Mangatainoka      | 2 57                  | 246.2            | 316               | 10308.00 | 381.98 |
| Daisy Verbelle Hengerveld              | C. C. Buckland, Monavale         | 2 142                 | 254.7            | 365               | 11414.90 | 359.78 |
| Hengerveld Butter-girl                 | Ditto .. ..                      | 2 111                 | 251.6            | 364               | 10258.90 | 337.52 |
| Flower II .. ..                        | I. H. McNair, Mangatainoka       | 2 0                   | 240.5            | 356               | 8930.30  | 327.59 |
| Pearl Lockhardt de Kol of Avondale     | C. C. Buckland, Monavale         | 2 133                 | 253.8            | 362               | 8811.30  | 303.38 |
| <i>Three-year-old Class.</i>           |                                  |                       |                  |                   |          |        |
| Duchess of Delhurst                    | W. I. Lovelock, Palmerston North | 3 329                 | 309.9            | 346               | 18485.50 | 615.85 |
| Gem Oakland Maida                      | C. C. Buckland, Monavale         | 3 170                 | 294.0            | 365               | 13960.10 | 430.67 |
| Belle Canary Clothilde                 | J. H. Parkinson, Opotiki         | 3 263                 | 303.3            | 328               | 13660.70 | 435.07 |
| White Rosette ..                       | J. Liggins, Tokomaru             | 3 301                 | 307.1            | 292               | 10011.00 | 423.75 |
| Dominion Mutual Mercedes of Rock       | Weraroa Experimental Farm        | 3 6                   | 277.6            | 336               | 12047.25 | 414.33 |
| Princess of Ashlynn                    | C. A. Hopping, Glen Oroua        | 3 296                 | 306.6            | 304               | 12211.80 | 413.66 |
| Gem Castine Fobes                      | James Hart, Raumati              | 3 90                  | 286.0            | 364               | 11308.70 | 393.68 |
| Dominion Lady Blanche de Kol Homestead | Weraroa Experimental Farm        | 3 212                 | 298.2            | 319               | 11716.75 | 386.29 |
| Dutchland Colantha Mercena             | J. Liggins, Tokomaru             | 3 342                 | 311.2            | 288               | 10052.00 | 385.24 |
| Dominion Domino's Pride                | Weraroa Experimental Farm        | 3 22                  | 279.2            | 317               | 9811.75  | 372.80 |
| Monona Johanna ..                      | R. Gilmour, Mangatera            | 3 310                 | 308.0            | 305               | 10847.80 | 365.22 |
| <i>Four-year-old Class.</i>            |                                  |                       |                  |                   |          |        |
| Annette V of Brundee                   | W. H. Bayliss, Mangatainoka      | 4 112                 | 324.7            | 330               | 14401.00 | 545.30 |
| Stella .. ..                           | G. Aitchison, Kaitangata         | 4 15                  | 315.0            | 365               | 15190.75 | 523.81 |
| Martha III of Brundee                  | W. H. Bayliss, Mangatainoka      | 4 186                 | 332.1            | 345               | 14123.00 | 430.56 |
| Pride II of Brundee                    | Weraroa Experimental Farm        | 4 255                 | 339.0            | 290               | 12157.50 | 380.08 |
| Glendowie Strawberry                   | C. C. Buckland, Monavale         | 4 221                 | 335.6            | 306               | 8021.80  | 350.72 |
| <i>Five-year-old Class.</i>            |                                  |                       |                  |                   |          |        |
| Leila Mooie of Ashlynn                 | C. A. Hopping, Glen Oroua        | 5 321                 | 350.0            | 304               | 13549.80 | 529.31 |
| De Kol Manor Beet's Fourth Daughter    | Ditto .. ..                      | 10 192                | 350.0            | 304               | 14186.80 | 511.71 |
| Ashlea Daphne ..                       | J. Liggins, Tokomaru             | 5-6 0                 | 350.0            | 302               | 12352.00 | 463.36 |
| St. Gertrudis ..                       | Weraroa Experimental Farm        | 5 163                 | 350.0            | 294               | 11567.50 | 435.54 |
| Ashlea Cissie ..                       | J. Liggins, Tokomaru             | 5-6 0                 | 350.0            | 286               | 10457.50 | 404.96 |
| Duchess of Woodlands                   | R. Gilmour, Mangatera            | 7 348                 | 350.0            | 365               | 12559.20 | 403.94 |
| Mottled Rose ..                        | Newton King, New Plymouth        | 6 322                 | 350.0            | 359               | 11325.50 | 359.71 |



PIETERIJE LASSIE.

Mr. W. I. Lovelock's leader in the two-year-old Holstein class. Age at start of test: 2 years 297 days, being a first calver.



ANNETTE V OF BRUNDEE.

Mr. W. H. Bayliss's leader in the four-year-old Holstein class. She was 4 years 112 days at start of test.

## AYRSHIRES.

| Name of Cow.                                     | Name and Address of Owner.           | Age at starting Test. | Fat req'd. Cert. | Yield for Season. |         |        |
|--------------------------------------------------|--------------------------------------|-----------------------|------------------|-------------------|---------|--------|
|                                                  |                                      |                       |                  | Days.             | Milk.   | Fat.   |
| <i>Two-year-old Class.</i><br>Miss Russell ..    | Messrs. Weir Bros.,<br>Pukehiki      | 2 256                 | 266·1            | 340               | 8252·60 | 365·84 |
| <i>Four-year-old Class.</i><br>Posy of Cambridge | Messrs. J. and C. Watt,<br>Cambridge | 4 31                  | 316·6            | 320               | 9869·10 | 406·91 |

## THE VITICULTURAL INDUSTRY.

S. F. ANDERSON.

WITH a view of obtaining from the grape-growers and winemakers of the Dominion complete information on the viticultural industry, a circular was prepared under the direction of the Director of the Orchards, Gardens, and Apiaries Division and forwarded to each grower in the Dominion.

The object in obtaining this information was that the Department might know the various soils suitable for viticulture, the classes of wine made, the methods adopted in the different districts, the extent and prospects of the industry, and the different drawbacks in the way of pests and diseases, with the means adopted for their control. It was also desirable to have this information to be able to give replies to inquiries reaching the Department from other countries that have been made from time to time.

Accompanying the circular mentioned was a letter to each grower, giving the following reasons for asking for the information, viz.:—

- (a.) That prompt and reliable statistics may be compiled for publication:
- (b.) That the information asked for may be available in connection with the interchange of all horticultural matters with other countries, which is so mutually helpful:
- (c.) That the vine-growers and winemakers may be brought into closer touch with the Department on all matters of interest in connection with viticulture.

Replies to the circular were received from sixty-three out of the 120 growers it was sent to. From the sixty-three replies received a number were selected that gave the fullest information on the questions asked in the circular. These have now been tabulated

for future reference. The results of the inquiries made by this circular show that—

(a.) Where the localities for vine-growing for the making of wine are selected with due regard for rainfall, and natural advantages obtained in undulating and even broken country clear of fog, with good natural drainage, it is a success—the quality of the soil not being so important a factor in grape-growing as in other branches of horticulture.

(b.) The failure of many going into the industry is frequently due to a want of first considering the cost of plant, cellar accommodation, the keeping of wine until fit for the market, and the necessary experience required. Winemaking is a business, and has to be learned like any other industry. It is quite possible, however, that where a number of growers in a district could combine and have a central winemaking plant and cellars they could be worked to their mutual advantage.

(c.) The system of training generally adopted by growers—viz., the double Guyot—is the best for our condition of climate.

(d.) The drawbacks to the culture of the vine, with the exception of the depredations of birds, are not greater than in other branches of horticulture. Phylloxera has become confined to quite a few places in the north, and need not be there had the growers taken advantage of the phylloxera-resistant stocks provided by the Department. Black-spot, except in very bad years, is quite under control by the systematic use of Bordeaux mixture. Mildew is also under control by the use of dry sulphur.

(e.) In some of the earlier reports on viticulture 2s. 6d. per gallon was quoted as a price that would pay the grower, provided the wine was sold after the first racking off—that is, for dry wine sold just after being made and clarified. Since that time labour has gone up quite one-third and land has increased in value, therefore its production costs more. In addition to this first cost, which may be put down at 3s. 9d. to 4s., every year it is kept adds rather over 1s. per gallon for cellar-work, keeping casks filled up, &c. This valuation is for wine in bulk. Sweet wines would be 1s. to 1s. 6d. per gallon more in price, casks extra.

There are now 278 acres in the Dominion devoted to wine-making, producing, as shown in the last returns, 90,350 gallons of wine. The value of this wine at the present cost after being clarified—that is, when about six months old—would be £18,070. When fit to put on the market it would be worth £22,588. When five or six years old the value is more than quoted above. As a considerable quantity of sweet wine is made, and the cost of making it is more than the dry, £27,000 would be a fair estimate of the value of the annual output of wine in this Dominion.

## LIME-SULPHUR WASH.

### DIRECTIONS FOR MAKING AND STORING.

SEVERAL inquiries having been received for information regarding the lime-sulphur wash for the control of apple and pear scab and of red mite, &c., the following extracts from Bulletin No. 330 of the New York Experiment Station are published for general information:—

#### FORMULA.\*

Lump lime—

|          |    |    |    |    |        |
|----------|----|----|----|----|--------|
| Pure CaO | .. | .. | .. | .. | 36 lb. |
|----------|----|----|----|----|--------|

*or*

|                  |    |    |    |    |        |
|------------------|----|----|----|----|--------|
| 95 per cent. CaO | .. | .. | .. | .. | 38 lb. |
|------------------|----|----|----|----|--------|

*or*

|                  |    |    |    |    |        |
|------------------|----|----|----|----|--------|
| 90 per cent. CaO | .. | .. | .. | .. | 40 lb. |
|------------------|----|----|----|----|--------|

|         |    |    |    |    |        |
|---------|----|----|----|----|--------|
| Sulphur | .. | .. | .. | .. | 80 lb. |
|---------|----|----|----|----|--------|

|       |    |    |    |    |             |
|-------|----|----|----|----|-------------|
| Water | .. | .. | .. | .. | 50 gallons. |
|-------|----|----|----|----|-------------|

#### MATERIAL.

The forms of sulphur which are adopted for concentrated mixtures are flowers of sulphur and light and heavy sulphur flour. The lime should be fresh lump lime, free from dust and grit. It should test not less than 90 per cent. calcium oxide, and should contain not more than 5 per cent. of magnesium oxide. Fruit-growers may sometimes purchase a satisfactory local lime, but before undertaking extensive operations one should assure himself that the quality is desirable.

#### COOKING THE WASH.

Heat about 10 gallons of water in the cooking-vessel and use it to slake the lime. To avoid losses of materials by spilling over,

\* The attention of fruitgrowers is called to the new formula which has been devised by the Chemical Department of this station. The investigations of the lime-sulphur mixture have shown that by the proposed formula there is a more economical use of the spraying-materials, which effects a considerable reduction in the cost of making the concentrate.

The formulæ which have been largely used in the experiments discussed in this bulletin are: (1) Lump lime, 60 lb.; sulphur, 120 lb.; water, 50 gallons. (2) Lump lime, 50 lb.; sulphur, 100 lb.; water, 50 gallons.

the lime should be added in small quantities at a time. As the slaking commences empty in the sulphur, and keep the mixture well stirred to break the lumps of sulphur and lime. When the entire amount of lime has been slaked add the full amount of water. A sufficient quantity should also be added to provide for shrinkage by the cooking, so that at the completion of the boiling there will be approximately 50 gallons of mixture. With kettles, an allowance of 10 or more gallons may be required, while an outfit using direct steam will usually not need additional water. A few boilings should indicate the quantities of water needed to make approximately the amount of concentrate given in the formula. In using barrels or kettles of 50 gallons capacity it is advisable to make one-half of the mixture provided by the formula, to avoid losses by the boiling-over of the materials. Boil the wash vigorously for one hour, in which time the sulphur should be completely dissolved.

A measuring-stick, gauged to the capacity of each cooking-vessel, will enable the fruitgrower to judge fairly accurately the volume of his spraying-material.

#### STORAGE OF LIME-SULPHUR SOLUTIONS.

If the concentrate is not for immediate use it should be stored in tight containers. After boiling is completed, strain the mixture into a barrel, which should be corked. A sample of the clear solution should be tested by the hydrometer, and the reading marked on the container to indicate the required dilution for future use. The coarse particles of sulphur in the residue may be cooked in later boilings. It is not advisable to attempt to separate the clear liquid from the sediment because of the time required by the operation and the loss of efficient liquids.

Lime-sulphur solutions may safely be stored if they are not subjected to very low temperatures. In general, one should avoid prolonged storage, and prepare the mixtures just preceding or at the time of the spraying operations, when danger of freezing is avoided. According to Stewart\* a solution of 32.1° Beaumé (1.28 sp. gr.) does not freeze above 5° F. and shows no deterioration by freezing. Mixtures of lesser density will freeze at higher temperatures. Preparations that are to be used within a few days may be kept, if desired, in open barrels. In this case, transfer the hot concentrate to the proper container, and cover the surface of the liquid with a thin film of mineral oil.

\* Penn. Sta. Bull. 92.

## DILUTIONS FOR DORMANT AND SUMMER SPRAYING.

For strong mixtures for the scale the diluted preparation should test about  $4.5^{\circ}$  B., for blister-mite about  $3.5^{\circ}$  B., and for summer spraying of apples about  $1^{\circ}$  B.\* Using these figures as bases the table below has been calculated, which shows the dilution required for a wide range of densities.

## DILUTIONS FOR DORMANT AND SUMMER SPRAYING WITH LIME-SULPHUR MIXTURES.†

| Reading on Hydrometer<br>(Degrees Beaumé). | Amount of Dilution: Number of Gallons of Water to<br>1 Gallon of Lime-sulphur Solution. |                   |                                     |
|--------------------------------------------|-----------------------------------------------------------------------------------------|-------------------|-------------------------------------|
|                                            | For San José Scale.                                                                     | For Blister-mite. | For Summer Spray-<br>ing of Apples. |
| 35                                         | 9                                                                                       | $12\frac{1}{2}$   | 45                                  |
| 34                                         | $8\frac{3}{4}$                                                                          | 12                | $43\frac{1}{4}$                     |
| 33                                         | $8\frac{1}{4}$                                                                          | $11\frac{1}{2}$   | $41\frac{1}{2}$                     |
| 32                                         | 8                                                                                       | 11                | 40                                  |
| 31                                         | $7\frac{1}{2}$                                                                          | $10\frac{1}{2}$   | $37\frac{3}{4}$                     |
| 30                                         | $7\frac{1}{4}$                                                                          | 10                | $36\frac{1}{4}$                     |
| 29                                         | $6\frac{3}{4}$                                                                          | $9\frac{1}{2}$    | $34\frac{1}{4}$                     |
| 28                                         | $6\frac{1}{2}$                                                                          | 9                 | $32\frac{3}{4}$                     |
| 27                                         | 6                                                                                       | $8\frac{1}{2}$    | 31                                  |
| 26                                         | $5\frac{3}{4}$                                                                          | 8                 | $29\frac{1}{2}$                     |
| 25                                         | $5\frac{1}{4}$                                                                          | $7\frac{1}{2}$    | $27\frac{3}{4}$                     |
| 24                                         | 5                                                                                       | 7                 | 26                                  |
| 23                                         | $4\frac{1}{2}$                                                                          | $6\frac{1}{2}$    | $24\frac{1}{4}$                     |
| 22                                         | $4\frac{1}{4}$                                                                          | 6                 | $22\frac{3}{4}$                     |
| 21                                         | $3\frac{3}{4}$                                                                          | $5\frac{1}{2}$    | $21\frac{1}{4}$                     |
| 20                                         | $3\frac{1}{2}$                                                                          | 5                 | $19\frac{3}{4}$                     |
| 19                                         | $3\frac{1}{4}$                                                                          | $4\frac{3}{4}$    | $18\frac{3}{4}$                     |
| 18                                         | 3                                                                                       | $4\frac{1}{4}$    | 17                                  |
| 17                                         | $2\frac{3}{4}$                                                                          | 4                 | 16                                  |
| 16                                         | $2\frac{1}{2}$                                                                          | $3\frac{3}{4}$    | 15                                  |
| 15                                         | $2\frac{1}{4}$                                                                          | $3\frac{1}{2}$    | 14                                  |
| 14                                         | 2                                                                                       | 3                 | $12\frac{3}{4}$                     |

## THE HYDROMETER AND ITS USES.

The lime-sulphur solution made by fruitgrowers is likely to vary in strength or degree of density of the clear liquid. It is important, especially in spraying for the scale, that the solution shall be diluted according to its degree of concentration in order that the mixtures may always be of a definite strength. Knowing the density of the clear solution, it is a simple matter to obtain diluted mixtures that are approximately uniform in their insecticidal properties. The hydrometer is used for this purpose. It is a glass instrument, consisting of a weighted bulb with a long stem, which

\* This density of the diluted mixture is based on the recommendation of Wallace (Cornell Bull. 289), who advises for summer spraying of apples 1 gallon of concentrate testing about  $32^{\circ}$  to  $33^{\circ}$  B. diluted with 40 gallons of water.

† These dilutions are based on the calculations in Table XI, Bull. 329.

determines the weight or density of liquids. Its general appearance is indicated in Fig. 1, which also shows a convenient glass vessel for holding the lime-sulphur solution. On the stem of the instrument there is a graduated scale, which should be read at the general surface of the liquid in which it is supported. Hydrometers in common use are of two kinds—the Beaumé and the specific gravity, which differ in the standards of measurements on which the graduated scales are based. There are instruments which have both measurements. Readings on the former are given in numerals expressed as degrees, while those on the latter are made in decimals. Instruments with a range of  $0^{\circ}$  to  $38^{\circ}$  Beaumé or 1.000 to 1.349 specific gravity are recommended. Hydrometers do not detect impurities in lime-sulphur solutions; these can be determined only by chemical analysis.

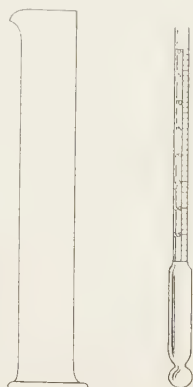


FIG. 1.

## NEW ZEALAND PEACHES.

### REQUIREMENTS OF OVERSEA MARKETS.

E. CLIFTON.

SOME months ago a consignment of peaches from New Zealand met with condemnation here. They were afterwards sent on to Vancouver, where they were treated in the same way. It was to some extent assumed that it was possible the importation may have been closely inspected, possibly even harshly treated. This, however, was not the case. You will observe from the following that the inspection is rigid, both here and in British Columbia—as, for instance, in the week ending the 1st August there were condemned at that northern port 889 boxes of apples, 1,492 boxes of pears, 2,395 of peaches; and again since that, on one day 492 boxes of pears, 1,100 of peaches. All this fruit was sent back to the United States, from whence it had come. It is recognized that this is a heavy toll, but the northern orchardists are as determined as those of California that their orchards, as far as possible, may avoid infection. The opinion of the northern country, Canada, is that in the United States the orchards must be considerably disease-infected, while I also find that in the southern

portion the same opinion hold as to the north. The chances are, however, that the orchards of both countries are about in a similar condition. It may, however, be pointed out that the transportation by rail is likely to carry disease into districts that are yet comparatively clean. It is claimed, indeed, that one infected car-load from the south that was distributed in one of the valleys of the north entailed finally a cost of £2,000 to eradicate the infection it conveyed.

## NEW ZEALAND HONEY:

### ITS WATER-CONTENT.

T. W. KIRK.

THE regulations under the Sale of Food and Drugs Act of this Dominion allow up to 26 per cent. of water in pure honey. It was felt that this might result in injustice to New Zealand honey, as producers were convinced that our produce never contains so high a percentage. I therefore obtained samples of honey from beekeepers all over New Zealand and had them submitted to the Dominion Analyst for examination. The attached list sets out his results:—

| Sample No. | Name of Producer.      | Address.                                | Percentage of Water. |
|------------|------------------------|-----------------------------------------|----------------------|
| 1          | Fiest, M. L. .. ..     | Papatoetoe, Auckland .. ..              | 16·60                |
| 2          | Smedley, N. .. ..      | Te Awamutu .. ..                        | 17·45                |
| 3          | Young, J. .. ..        | Repongaere, Auckland .. ..              | 17·52                |
| 4          | Blair Bros. .. ..      | Tryphena, Great Barrier, Auckland .. .. | 17·67                |
| 5          | Roberts, J. H. .. ..   | Tauranga .. ..                          | 17·73                |
| 6          | Perry Bros. .. ..      | Runciman, Auckland .. ..                | 16·95                |
| 7          | Foster, Samuel .. ..   | Mangonui .. ..                          | 18·10                |
| 8          | Trythall, A. B. .. ..  | Cambridge .. ..                         | 17·30                |
| 9          | Wedde, H. C. .. ..     | Raurimu .. ..                           | 15·62                |
| 10         | Anthony, Stephen .. .. | Amodeo Bay .. ..                        | 17·70                |
| 11         | Pearson Bros. .. ..    | Claudlands, Waikato .. ..               | 15·97                |
| 12         | Ruakura Apiary .. ..   | Hamilton .. ..                          | 17·64                |
| 13         | Hobbs Bros. .. ..      | Palmerston North .. ..                  | 16·07                |
| 14         | Alton, J. .. ..        | Upper Hutt .. ..                        | 17·52                |
| 15         | Empire Company .. ..   | Wellington .. ..                        | 15·92                |
| 16         | — .. ..                | Wanganui .. ..                          | 16·52                |
| 17         | Young, J. .. ..        | Patutahi, Gisborne .. ..                | 17·65                |
| 18         | Honore, — .. ..        | Manaia .. ..                            | 16·17                |
| 19         | Walker, R. .. ..       | Otaki .. ..                             | 16·78                |
| 20         | Askew Bros. .. ..      | Manakau .. ..                           | 15·40                |
| 21         | Cooper, Captain .. ..  | Papawai, Greytown .. ..                 | 14·43                |
| 22         | Lenz, W. .. ..         | Masterton .. ..                         | 16·32                |
| 23         | Baillie, W. .. ..      | Carterton .. ..                         | 16·11                |
| 24         | Elliott, — .. ..       | Le Bon's Bay .. ..                      | 15·20                |

| Sample No. | Name of Producer.      | Address.               | Percentage of Water. |
|------------|------------------------|------------------------|----------------------|
| 25         | Barrett and Bray .. .. | Wainui .. ..           | 15.50                |
| 26         | Stewart, W. .. ..      | Southbridge .. ..      | 15.40                |
| 27         | Kidd and King .. ..    | Cust .. ..             | 14.58                |
| 28         | McRae, Donald .. ..    | Waihao Downs .. ..     | 15.78                |
| 29         | Chisnell, — .. ..      | Hinds .. ..            | 16.27                |
| 30         | Barrett, H. .. ..      | Tai Tapu .. ..         | 16.57                |
| 31         | Clayton, — .. ..       | Peel Forest .. ..      | 16.20                |
| 32         | Jacobsen, C. A. .. ..  | Little River .. ..     | 16.16                |
| 33         | Jones, Mrs. .. ..      | Glentunnel .. ..       | 16.42                |
| 34         | Garret, T. .. ..       | Kaikoura .. ..         | 17.03                |
| 35         | Nelson, — .. ..        | Rangiora .. ..         | 16.16                |
| 36         | Barnett, H. .. ..      | Leeston .. ..          | 16.41                |
| 37         | Moore, J. A. .. ..     | Havelock .. ..         | 15.25                |
| 38         | Daines, F. .. ..       | Blenheim .. ..         | 17.83                |
| 39         | Langford, E. B. .. ..  | Bainham, Nelson .. ..  | 17.53                |
| 40         | Allan, J. .. ..        | Wyndham .. ..          | 15.95                |
| 41         | Gibb, R. .. ..         | Menzies Ferry .. ..    | 17.41                |
| 42         | Gardiner, L. .. ..     | Invercargill .. ..     | 16.17                |
| 43         | Hart, R. C. .. ..      | Round Hill .. ..       | 16.87                |
| 44         | Jones, R. .. ..        | Balclutha .. ..        | 15.76                |
| 45         | Currie, A. E. .. ..    | Maungatua .. ..        | 16.20                |
| 46         | McLeod, J. .. ..       | Outram .. ..           | 16.72                |
| 47         | Moffett, T. D. .. ..   | Waikaia .. ..          | 15.75                |
| 48         | Stewart, R. .. ..      | Crookston .. ..        | 15.05                |
| 49         | Ritchie, D. .. ..      | Cromwell .. ..         | 17.07                |
| 50         | Appleby, J. H. .. ..   | Palmerston South .. .. | 16.75                |
| 51         | Michelson, H. H. .. .. | Pukeuri .. ..          | 16.33                |

### AGRICULTURAL SHOW DATES.

Manawatu and West Coast A. and P. Association. — Palmerston North, 4th to 6th November.

Canterbury A. and P. Association. — Christchurch, 11th to 13th November.

Waikato A. and P. Association.—Hamilton, 17th and 18th November.

Banks Peninsula A. and P. Association.—Little River, 24th November.

Auckland A. and P. Association.—Auckland, 26th to 28th November.

Dannevirke District A. and P. Association.—Dannevirke, 10th and 11th February; Ram Fair, 12th February.

A great deal has been done to make agriculture a science; the next thing to be done is to make farming a profession.

According to the Russian Year-book, there are in the Russian Empire about 5,706,211 beehives owned by private owners and peasants. It is added that apiculture is bound to become one of the chief industries of eastern Siberia in the near future.

## KUMERAS, OR SWEET POTATOES.

W. C. BERRIDGE.

SWEET potatoes, or kumera, as they are called by the Maoris, are becoming more popular, but they are not grown to anything like the extent they would be were their virtues better understood. The Maoris had many superstitions connected with their culture, and even some white farmers believe that some hocus-pocus is essential to their successful production.

When the Maoris made their traditional voyage from Hawaiki to New Zealand they brought a number of varieties with them. I have heard nearly forty varieties enumerated by the Maoris. Since the variety known as the "Waina" came into possession of the Natives they have gradually discarded most of the others with the exception of a few varieties, such as the Utu-utu, Taro-mahoe, and Rekamaroa, the other kinds being mostly small, rough, and irregularly shaped, and light croppers. In a few of the isolated kaingas the older Maoris still grow a few of the old kinds, but more from association's sake than from the intrinsic value of the variety.

There are many kinds grown in the United States of America. Some fifty varieties are enumerated in one of the bulletins published by the Department of Agriculture of that country. Eight varieties of these are being tested at the Tauranga Experimental Farm, and other varieties will be obtained in the near future.

In the warmer parts of the North Island kumeras can be grown with profit and make an excellent and generally appreciated change of diet. They are more nutritious than the Irish potato, and, owing to their gentle laxative action, could be used with advantage as an article of diet by those in need of that treatment.

The sweet potato is apparently not subject to the same diseases as the Irish potato—at least, it has not yet been attacked—and, unlike it, is not much injured by exposing the tubers to direct sunlight when digging the crop.

The tubers should be lifted before heavy frosts. Should the vines be killed by a frost they should at once be cut off and the tubers be protected by throwing some earth on the ridges until the tubers can be dug, which should be as rapidly as possible, as sweet potatoes that are frosted decay rapidly in storage.

The tubers should be dug with a broad-tined fork, taking great care that they are not bruised or cut when digging, as they rot or decay quickly when bruised. All cut or bruised tubers should be used at once lest they decay. A furrow turned away from the ridges with a one-horse plough greatly facilitates the digging.

Sweet potatoes thrive best on a moderately fertile sandy loam which does not contain an excess of organic matter, and soils with a considerable percentage of lime or are underlaid with limestone are well adapted to the growing of this crop; even a good dressing of lime shows a marked improvement on the crop. Like many other crops, the sweet potato thrives on newly cleared land, owing to the ample supply of humus and potash contained therein. It is not advisable to plough very deeply, as a great depth of loose soil, or an alluvial soil having no subsoil, will produce long, irregular-shaped tubers not suitable for marketing. Planting on land having a loose sandy soil underlaid by a well-drained clay subsoil will tend to produce the type of rather thick, dumpy potatoes that are most sought after and bring the highest price in the market.

The sweet potato is one of the crops that thrive well when grown with commercial fertilizers, provided sufficient humus exists in the soil. A mixture of 100 lb. sulphate of ammonia, 200 lb. blood and bone, 500 lb. superphosphate, and 200 lb. sulphate of potash, applied at the rate of 5 cwt. up to 10 cwt. per acre, has given the best results on most soils. The land should be ploughed, fertilizer-sown, and harrowed in a week or ten days before planting. Then when the planting season arrives the land should be thrown up in ridges about 30 in. apart and a chain harrow or a brush harrow drawn lengthwise along the ridges until the latter are 4 in. to 6 in. high. The land is then ready to plant the sets, plants, or draws, as they are variously called. The plants are set about 18 in. to 24 in. apart in the rows.

There are various methods of raising the plants. Perhaps the most successful is to make a hotbed of fresh stable manure, taking care to turn the manure over several times before finally making the hotbed; then cover with about 4 in. of sandy loam. Upon this the tubers are to be laid thickly about  $\frac{3}{4}$  in. apart, taking care to avoid leaving the tubers in contact with each other, as that will often cause them to rot. The tubers should then be covered with 3 in. or 4 in. of clear sand, and the hotbed then covered with a sash to retain the heat. They should be kept only moderately moist, as too much moisture causes the tubers to decay.

In a few weeks' time the plants are ready to draw. When they are about 4 in. high is about the best size to draw them, taking care that there are sufficient fibrous roots to start them growing readily when planted out. When drawing the plants the tubers should be held firmly in their position with the fingers of one hand while drawing the plants off with the other hand, so that the tubers will not be disturbed in their beds. They will then yield several successive crops or draws. It is best to draw or pull off the plants singly, as less will then be broken. This can best be secured by pulling the plants with a sidelong motion. If a glass sash is not available to cover the bed with, four boards nailed together and covered with calico answers very well, and requires less care in ventilating.

Where not convenient to make a hotbed the tubers can be sprouted by choosing a warm sunny position facing the north, sheltered from the cold winds, and bedding the tubers in sandy soil and covering with a sash or calico-covered frame. The plants grown by this method are hardier but later in the season, and the tubers do not make so many plants as those grown in a hotbed. The largest tubers yield the greatest number of plants, but so far I have been unable to determine whether large tubers for seed yield better crops than small tubers. Our experiments show, however, that smooth even-shaped tubers chosen for seed have a tendency to yield more uniform and even-shaped tubers. When plants are grown on a hotbed it is advisable to harden them off before planting them out in the ridges.

Little is gained in planting out the sets until the weather becomes warm and settled, as the sweet potato is a native of the tropics and revels in the hottest weather. Should the weather be very dry and hot when it is desirous of planting, it will be advisable to give some water to each plant when setting. Very few plants will fail to grow when so treated.

To save stooping, a pair of wooden tongs can be used. This can be made by nailing two stout laths together with a small piece of wood between at the top end to keep them about an inch apart. The plants are dropped along the ridges by one person and followed by the planter with the tongs. Seizing the lower end of the plant with the tongs, it is pushed into the soft earth and then released. The tongs spring apart, and the plant is then in a position to grow. If the weather is dry a small quantity of water may be poured down the hole left by the tongs and coming in direct contact with the roots. The earth is then pressed lightly in close contact with the plant. Under this method few fail to grow.

If planted just before rain or soon after rain, water is not needed for transplanting, and the planter should then carry in the other hand another piece of wood to press the soil in close to the roots. Many thousand plants can be set in a day by this method. It saves the backaching work of stooping when planting with a spade or a trowel.

When seed tubers are scarce, cuttings of the vines can be used for plants, and these generally make smoother, better-shaped potatoes than those from sets, plants, or draws, but the crop is later in maturing.

The varieties with stout, fleshy vines, like the Southern Queen, root the easiest from vine-cuttings, and, being grown from fresh young vines, are not so subject or so liable to be diseased as those grown from the tubers.

The pest that has hitherto been the most serious is a large green (or green marked with brown) horned caterpillar. A few turkeys or ducks will soon clear a patch of sweet potatoes, or the pests can be easily hand-picked. The leaves eaten by this grub indicate where they can readily be found, or they can be poisoned by an arsenical spray. When the vines spread over the ground they should not be allowed to strike root, as they will readily do if the vines be covered with earth or during rainy weather.

The vines should be moved occasionally to prevent rooting. This can be readily and rapidly done by using a crooked stick, similar to a hockey-stick. If allowed to take root they will go on extending their growth at the expense of the tubers. A light crop will be the result. Another serious objection to deep ploughing is the difficulty in digging the crop caused by this, as some varieties have a tendency to make their tubers at the end of long roots, notably the red and white Bermuda varieties. These sometimes are found 3 ft. and 4 ft. away from the crown of the plant, which makes them difficult to dig.

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Among the 113 people who visited Moumahaki Experimental Farm last month was Professor Rutherford, the famous New Zealand scientist, who was accompanied by several of the leading farmers of Taranaki. They all spoke highly of the work being done for agriculture at Moumahaki.

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Many farmers in Denmark have 25 per cent. of their land in alfalfa and 25 per cent. in roots. This explains to a great extent the large stock maintained there on small farms.—*Paul A. Boving, Macdonald College.*

## WORK FOR THE COMING MONTH.

NEW ZEALAND is a country of wide variation in climatic and soil conditions. In applying suggested procedure it is, therefore, necessary for the farmer to amend it to suit local weather-conditions and the requirements of his soil—information which can best be ascertained by a study of these problems on the part of the farmer himself. Nothing can take the place of local knowledge. Little advice on an agricultural subject is capable of general application in its entirety.

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### THE FARM.

PRIMROSE MCCONNELL.

PREPARATIONS for the general root crop will now be in full operation. Mangel-sowing should be completed this month, and where the work has been finished in October there is a better chance of obtaining a good stand.

Swedes are sometimes sown in November, but in the North Island the middle of December is soon enough in the average season. The preparation for this crop should be thorough, and the tilth as fine as possible. The writer is aware that very good crops of swedes have been grown where comparatively little cultivation has been given, on rich soil—not as a result of the indifferent cultivation, but in spite of it. Where the land has been ploughed for some time and lying fallow a fine seed-bed is not difficult to obtain, but where a catch-crop has been fed off, and the land is just being ploughed, it is difficult to obtain the necessary fine tilth, particularly on heavy land. The abnormally dry weather has in some instances made ploughing very heavy work, and at this station (Ruakura) six horses are required to do the work usually done by four. Heavy land should be worked immediately behind the plough, otherwise a fine seed-bed will be obtained with the greatest difficulty. It is a good plan to roll after the plough, then double-disc, tine-harrow, and roll. In exceptional cases these operations may require to be repeated. If time permits, however, nothing makes such good work as repeated ploughings. In any case the land should be rolled just before sowing the seed. On small, intensively cultivated farms it will undoubtedly pay to drill the seed in rows about 27 in. apart, and afterwards single out the plants to a distance of 10 in. apart in the rows, but where com-

parative large areas are grown, as in New Zealand, such a system is almost impossible. The former system makes it possible to horse-hoe and keep weeds in check, and the man on a small area of land cannot afford to devote any portion of that area to weed-growing. When it is intended to single out the plants, the seeding should be at the rate of 2 lb. to 3 lb. per acre. As manure for the swede crop, basic super, or a mixture of three parts basic super and one part bonedust, may be used with every confidence. The amount applied per acre will depend on the quality of the soil, but, generally speaking, 3 cwt. is sufficient. On light land add 15 lb. of sulphate of potash.

Potato-planting should be brought to a conclusion as soon as possible, and those potatoes earlier planted may be harrowed down and remoulded up.

Early-sown forage crops, such as rape, Buda kale, chou moellier, &c., that have been sown in rows a sufficient distance apart should be horse-hoed as soon as the weeds appear.

The first sowing of maize may now be made for green forage. A maize-seed hopper that can be attached to the double ridger is now on the market, and is excellent for this work, as seed and manures may be sown in one operation, which is impossible with the ordinary corn-drill. The preparatory cultivation for maize should be deep and thorough, and, as in the case of swedes, rolling should precede the seed-drill. When no suitable implement is obtainable the seed may be broadcasted by hand at the rate of  $1\frac{1}{2}$  bushels per acre, and disced or lightly ploughed under. When the plants reach a height of 6 in. a stroke of the tine harrow is very beneficial, and there need be no fear of injury to the crop. A good maize-manure is a mixture of three parts of basic super to two of bonedust, on light land adding 20 lb. of sulphate of potash. Many authorities advise a nitrogenous manure for this crop, but the writer's experience in New Zealand is that such manures are seldom profitably applied, and where extensively used the procedure denotes anything but good farming. All experiments lead to the conclusion that, although there are some exceptions, New Zealand soils still contain a sufficiency of nitrogen, and this supply may be maintained without the application of such expensive manures as nitrate of soda, sulphate of ammonia, &c. Even blood- and -bone manure should be used with much discrimination. To apply it to clay soil is a pure waste of money.

At present there is every sign of a dry season, and farmers who have a good area of lucerne will be in a good position to see it through comfortably. The first growth of this fodder will now be fit for cutting, and if the weather is not suitable for haymaking, it

may be "soiled" or made into ensilage. In the latter case it is better mixed with grass or some other non-legume.

By the end of the month early-sown rape should be mature enough for turning in the lambs, and for the first two days they are better taken off in the night-time. Afterwards they should be removed to a pasture about every fourth day, and kept off altogether in wet weather. Rock salt should also be provided, and, if available, the addition of lucerne chaff will shorten the fattening-period very considerably.

Healthy, well-fed, in-foal mares should be worked almost to the date of foaling, but carting, or any heavy shafting-work, should be avoided as much as possible. It is the pampered, overfed, idle mares which give trouble in foaling, and often cause great loss. On the other hand, a valuable old mare which is past work may breed well for several years.

If not already done, hay implements should be thoroughly overhauled, and all defects made good.

## THE ORCHARD.

W. A. BOUCHER.

### CULTIVATION.

THE working of the soil both in orchard and garden is most important if the best results are to be obtained in the production of fruit of normal size and of good quality. As many of our orchards have been planted in clay soils, advantage must be taken of bringing the land into good tilth in the early part of the season when the soil is neither too wet nor too dry for satisfactory working. No hard-and-fast rule can be laid down as to when this should be done, for everything will depend upon the climatic conditions of the season, but the grower must rely upon his own judgment and experience as to when the soil can be worked to the best advantage.

### ORCHARD PESTS.

*Scale Insects.*—It has been pointed out in previous issues of this *Journal* that scale insects on deciduous fruit-trees should be dealt with by the application of the red-oil spray, winter formula, when the trees are quite dormant. Instances frequently occur, however, especially among growers who are cultivating fruit for domestic purposes only, where the winter spraying has been overlooked for

some reason or other, principally from lack of knowledge of the pest itself, its habits, and the most satisfactory method of control. In such instances it is not yet too late to spray effectively. The young scale will be on the move during the late spring and early summer. By applying the kerosene emulsion at this period they can be readily destroyed. The kerosene emulsion will be found to be equally effective in destroying scale on citrus fruit-trees—in fact, kerosene emulsion should be applied to lemon and orange trees at least once each season if it is desired to keep them free from scale and the black smut or fungus which is due to the presence of sucking-insects on the trees.

*Codlin-moth.*—This pest was at one time regarded as being practically beyond control, but now the commercial grower has quite a different opinion. He realizes that by procuring a reliable brand of arsenate of lead and spraying carefully and thoroughly that the percentage of infected fruit will be infinitesimal. Of late years much good work has been done; in fact, where spraying has been effectively carried out the annual cost of keeping codlin-moth under control has been considerably reduced. This has been brought about by the reduction of the number of sprayings during the season, due to the use of reliable spraying-compounds and careful work on the part of the growers.

*Leaf-roller Caterpillar.*—This pest will often cause a considerable amount of blemish on what would otherwise be perfect fruit. In districts where codlin-moth infection has to be guarded against no further treatment will be required for the control of the leaf-roller caterpillar, but in districts that are free from codlin-moth it would be a wise precaution to spray with arsenate of lead in order to prevent blemish by the caterpillar.

*Bronze Beetle.*—Inquiries are frequently received as to the most effective method of keeping this pest in check. Like the caterpillar, the bronze beetle causes serious blemish to the fruit if the necessary precautions are not taken to prevent this. Complaints have been received that spraying with arsenate of lead is not entirely effective in checking the ravages of the beetle. The addition of resin-solution to the arsenate of lead during the early part of the season when the beetle is troublesome will much increase the effectiveness of the latter. Proportions: Resin solution,  $1\frac{1}{2}$  lb.; washing-soda, 1 lb.; water, 2 gallons. Method of preparation: Boil the water, dissolve the soda, add the resin, and then continue boiling and stirring until the resin is dissolved. Care is necessary to prevent the mixture from boiling over—in fact, for this reason it is desirable that the resin-solution

should be prepared out-of-doors. For bronze beetle add 3 quarts of the solution to 50 gallons of arsenate-of-lead spray.

*Fungus Diseases.*—Black-spot, or, as it is frequently termed, apple or pear scab, is almost invariably troublesome during the early part of the season. Spray with the Bordeaux mixture, summer strength, either in conjunction with or apart from the arsenate of lead. Some growers, as mentioned in the last issue of this *Journal*, now prefer to use the mixtures separately, as they consider that the compound mixture is more apt to cause spray injury. Other growers now prefer the lime-sulphur solution. Particulars for the preparation of home-made lime-sulphur will be found in another part of this issue.

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## GRAPE - CULTURE.

S. F. ANDERSON.

THE work for this month will be regular attention to the fruit-bearing shoots to control the growth. By controlling the growth is not meant the heavy defoliating of the vines with the mistaken view held by some growers that taking away foliage must necessarily divert the vigour of the vines to enlarging the fruit. Take any fruit-bearing tree where the foliage has been injured and the fruit is always small—a peach-tree, for instance, that has been attacked in the early summer by red spider—invariably the fruit will be poor and unmarketable. Note the difference in the case of one well provided with deep-green glossy foliage. The effect of taking off too much foliage from the vine brings about the same result. It is true that the summer pruning of the vine is very necessary, but it can be done without overtaxing the natural resources of the plant. To give an instance of bad work. A photo was shown to the writer of a vinehouse with a very heavy crop of grapes. The owner had been thinning out the foliage until the floor was covered with the leaves and shoots broken off the vines. Had this work been proceeded with from the beginning in the proper way the house would not at any stage have presented that appearance. When the shoot bearing the fruit has grown some five or six leaves beyond the fruit it may be pinched back to two leaves beyond the young bunch. The wood is then quite soft and the leaves not fully expanded. Very soon after, growth pushes out from this place, and is allowed to proceed until another

five or six leaves have been formed, when another stopping may be made two leaves beyond the first stopping. We now have four leaves beyond the fruit. The stopping may go on in this way for four or more times, always leaving more leaves. After this has been done several times it will be noticed that the joints of the shoot become short and strong, bringing the leaves closer together. This check to the terminal growth causes side shoots to push out. To deal with these, consideration must be given to the space now between the rods. If a shoot from one rod, after being stopped as described above, is overlapping one coming from the rod next to it, or likely to do so, then when dealing with the side shoots, or sub-laterals as they are called, one, two, or more leaves may be left on them—in any case, always one. Never break them clean out. By observing this method of controlling the quantity of foliage we provide each lateral and bunch of grapes with twelve to fifteen leaves. If space will permit it without overcrowding, more may be left.

The relation of foliage to fruit is so often lost sight of in the reckless defoliation of vines that it will not be out of place at this stage of vine-growth to quote the remarks of some plant physiologists on the subject. Writing on leaves, Sir J. D. Hooker remarks, "Their use is to provide a large surface for exposing to the action of sunlight and heat the food materials absorbed by the plant, and thus cause assimilation. They also provide for transpiration, and they absorb carbonic acid from the air." Another writer on the functions of the leaf says, "The sap, after elaboration in these organs, differs in every plant, though as far as experiments have been tried it appears to be nearly the same in all vegetables when it first reaches them. The power of leaf to generate sap is in proportion to its area of surface, exposure to the light, and congenial situation."

Before the end of this month thinning the berries will have to be commenced. This is an important branch of vinehouse work, and applies to all house-grown grapes, not excepting even such open-growing varieties as Barbarossa. The fruit of all house-grown grapes is immensely improved by thinning. In such close growers as the Black Hamburg, Gros Colman, and others it is positively necessary if fine table-fruit is to be expected. The finest exhibition of table-grapes that has come under the notice of the writer was in a Christchurch vinery. They were Barbarossa. On one rod there were twenty bunches, and they averaged 5 lb. to the bunch. They had all been well thinned. The grower, to satisfy himself, selected one of the largest, and, after thinning, counted the number cut out. They amounted to more than two-thirds of

the original number in the bunch; yet the bunch when cut for the market, fully ripe, weighed 9 lb.

Great care must be taken when thinning not to bruise those left on, as they show it by becoming discoloured, and carry the marks up to their full development. With most of the grapes nearly a cubic inch of space is required for each berry. In some, like the Gros Colman, they are benefited by the shoulders being taken off. Overcropping a vine is the cause of much trouble in the vinehouse. It weakens the plant, making it more subject to disease, causes want of colour in the fruit, shanking, and affects its future bearing.

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## THE POULTRY-YARD.

F. C. BROWN.

### NOVEMBER WORK.

WITH heavy cost of production facing the poultry-keeper it will only be in exceptional cases, where specially favourable conditions are present, that it will pay to hatch a November chick. Even the October chickens must be enjoying good shelter in hot weather, good feed, and careful management if they are to be highly profitable. In this connection every means should be taken to provide ample accommodation. Crowded stock can never give the best account of themselves, but with young growing stock the restriction of sleeping and exercising quarters is merely inviting trouble. The successful rearing of chickens depends on attention to numerous details. For instance, many people content themselves with filling the water-fountain every morning, quite overlooking the fact that it is standing in the sun all day, and that for the greater part of the time the little ones are compelled to drink warm water, a frequent cause of bowel trouble—almost as bad a mistake as leaving the water-fountain empty. Green food is the life of a chick, and yet how many there are who fail to provide any at all. This remark applies with equal force to grit. Cleanliness is the all-essential, and the later the chick the greater the need for keeping everything as sweet and as clean as possible. It is a common mistake to allow chicks of different ages to run together, some people even going so far as to allow three-months and even two-months old birds to run with adult stock. It is useless taking every care of the chickens up to these ages and then placing them at such a disadvantage. There are few old birds which are quite free of vermin, and the incubator chicken, given careful management,

should go right on to maturity without having to fight parasitic life; but introducing them to probable vermin-infection by forcing them to herd with old stock is obviously making them run a grave risk of getting a set-back.

Many inquiries have reached me lately as to leg-weakness and apparent paralysis of the limbs. The invariable cause, I have found, is insufficient exercise—keeping the chickens, in the first place, confined too much in a small brooder-run without access to outside runs, and generally coddling at a time the hardening-off process should have been commenced. It is a good idea to occasionally throw in little pieces of tough meat to the chickens, to encourage them to take exercise, which they will do in their tussles to get possession of the coveted morsel. This and jumping at a bunch of green stuff hung low in the run will also keep them occupied and be an excellent means of checking the bad habits chickens sometimes form when they have nothing better to do, such as pecking at each others' toes, or pulling feathers, &c. Experience, of course, should teach the poultryman how to avoid these troubles, but at the root of them all is crowded and dirty quarters and insufficient exercising-space.

It is always advisable to open up any chicken that dies, in order to discover, if possible, the cause of death. Recently I was asked to advise on the continual deaths of chickens. I found on opening them up that pieces of fibrous green material 2 in. in length had blocked up the gizzard. All green stuff for chickens should be fresh, tender, and be cut up very fine. This feeding of stuff of undesirable size and length is specially bad where no grit is fed with it. Much mortality among chickens also takes place through the little ones picking at curtains, sacking, &c., the loose fibres of which form in a ball in the gizzard and cause death.

The sexes should be separated as soon as possible. It is probable well-fattened cockerels will be worth good money in the approaching festive season, and it will therefore pay to look after the male as well as the female chickens. When the former are from three to three and a half months old confine them in small runs and feed them on soft mashes, so that at from four and a half to five months old the cockerels will be in prime condition, for it is only then that high prices will be given for them. The birds must have something more than a frame. It will generally pay the grower to sell direct to the poulterer by the pound rather than send them to market to be sold by the pair. In the case of promising cockerels, however, which it is intended to keep for breeding purposes, these should be given ample range and be fed on a hard diet with a good supply of green stuff.

## INCUBATOR DIFFICULTIES.

Quite a number of poultrymen are having trouble with their work of incubation, overdue eggs being the principal difficulty. If eggs are to hatch out at the right time the correct range of temperature must be maintained throughout; the thermometer must be located accurately so that the recorded temperature is being experienced in the right place—in a line with the top of the eggs; the eggs must not have been too stale—the germs require to be vigorous (that is, the eggs must have come from strong parents in the pink of condition during the breeding season); circulation of fresh air must be provided in the incubator-room; and provision of the necessary moisture is necessary. There are other minor details, but those outlined are the more important. A mistake sometimes made is to attempt to manage all makes of machines on the one principle. In the matter of moisture-supply it is often fatal to success to depart from the maker's instructions, though with some machines it may be necessary to amend the instructions to a certain extent both in regard to ventilation and moisture. Some incubators require the supply of moisture to be maintained right throughout the hatch, others may only require a moisture-tray to be filled during the first and final stages of the hatch; while there are incubators in common use which the makers hold do not require any moisture. It is only safe to depart from the maker's instructions when the operator has considerable experience of incubation-work or when he is following the advice of a man of wide knowledge of artificial hatching. There are no two incubators on the market which require exactly similar treatment.

The most common cause of overdue hatches, however, is that the machine has been run at too low a temperature. The thermometer may have been placed too high above the eggs, or the thermometer may not be accurate. If the eggs do not pip up to time the only safe course to take in the following hatch is to have the thermometer tested and to see that it is hung in the correct position, the bulb being allowed to rest against the top surface of an egg.

## OVARIAN TROUBLES.

While it is necessary, if a highly profitable egg-yield is to be secured, that the layers must be forced in the dear season, it is inadvisable to continue the heavy forcing diet right throughout the year, especially in the natural laying season. Giving birds a big supply of animal food when there is no necessity to, as at the present time, is a common cause of ovarian troubles, especially that of protrusion of the oviduct. The danger of the high forcing diet at

the present time is especially great where meat-substitutes, more especially blood-meal, is employed in the mash, whereby the bird is compelled, if she is to get a full meal, to eat more of the concentrate than her nature demands.

#### THE PROFITABLE EGG.

There are still far too many people having fowls which only lay in the cheap-egg season, and instead of securing new blood bred at the right time they go on perpetuating the old strain and hatching late in the season. There is money in poultry, but not unless modern methods are adopted. Especially is it necessary to keep only the most profitable stock in these days of high cost of feed. At the present time there is hardly a poultryman to be met with who has inferior laying-stock; "all the birds are laying well," they will declare. It is very different, however, in the winter months, when eggs are at a high price. Then it is only those who have good stock and hatch at the right time who can boast of big egg-yields.

#### GREEN FOOD.

Poultrymen who have a good patch of lucerne will be in a strong position this year, as a liberal supply of this great fodder will be found the best of all means of reducing the feed-bill. Even well-cured lucerne hay, chaffed and steamed overnight, will be found a valuable bulking material for the morning mash in the off season, while a little of this may be even used for the mash in the heavy laying season—that is, at a time like the present, when the cost of production is unduly high. There is nothing better for keeping fowls in good condition than an ample supply of chaffed green lucerne fed in troughs during the day. Experience is proving that lucerne can be grown under a great variety of conditions, and is thriving in locations which at one time were thought to be an impossible habitat for this plant. Certainly great care has to be taken to secure a thoroughly good seed-bed free of all weeds, but when the lucerne is established it can be maintained in a flourishing condition by the occasional application of liquid fowl-manure.

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#### THINGS TO REMEMBER.

Over-forcing for eggs in the breeding-pen is often the cause of poor hatches and mortality during the brooder stage.

The brooder should be given a thorough cleaning-out and be sprayed with a strong disinfectant before a fresh lot of chickens is placed in it.

Shade is necessary in the summer for fowls of all ages.

Lice are a constant drain on a fowl's vitality, and where these pests are numerous a bird cannot make the best use of the food she consumes. It will pay well in these days of high-priced food-stuffs to continually fight vermin.

Good feeding and good housing increase the productiveness of fowls; poor feeding and poor housing decrease it.

Disease is mostly found in dirty quarters and where fowls are kept year after year on stale ground which is never purified by being turned up to the influence of the sun and air.

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## THE APIARY.

F. A. JACOBSEN.

### SWARM-CONTROL.

THE successful management of colonies of bees in the spring will lay the foundation for a good honey crop. It is useless to expect a large surplus of honey from a colony that has not been "managed" and the swarming impulse removed. As an example of what may be expected to happen should a colony be left alone, the following instances will suffice. Four swarms issued during the season (it is possible for more to do so), with the result that the parent colony was so weakened from loss of bees that it barely gathered sufficient honey to keep it through the following winter. The first swarm gathered a little surplus, and the remaining three died of starvation during the winter. From another hive in the same district that had been well attended to and swarming kept in check, over 200 lb. of honey was extracted and 40 lb. left for winter stores. Hence it will easily be seen that a colony which has swarmed excessively is useless for honey-gathering purposes, and therefore useless commercially. It is necessary for all beginners who want a crop of honey to grasp this fact.

### YOUNG QUEENS.

The next important matter is to realize the importance of having a young queen in each hive. This will have a considerable bearing on controlling swarming, as all large and experienced apiarists know that young queens are less liable to swarm than old and failing ones. After they are two years old the large majority fail to lay sufficient eggs to keep the colony populous, and the old queen is either superseded by the bees or she goes with the first swarm in

the spring. A young vigorous queen means a populous colony, and this in turn means more bees to gather a surplus. The beginner need not worry over what kind of bees he has. It should be his object to learn the internal economy of a hive first, after which he may go in for improving his strain or even breeding his own queens.

#### HIVE-VENTILATION.

Another feature in swarm-control is ventilation. During the late spring and summer those interested have probably noticed a number of bees on the alighting-board in front of the hive flapping their wings. They are facing the hives with their abdomens pointing upwards. This work is called "fanning," and they are ventilating the interior



*F. A. Jacobsen, photo*]

#### A SELF-CONTAINED APIARY IN THE PAHIATUA DISTRICT.

All the hives, admirably constructed, were made entirely by the owner.

of the hive. To assist them in their work, and so permit more bees to work in the fields, place two half-inch blocks between the super and the bottom board, thus widening the entrance and permitting more ventilation. I do not think enough attention is paid to this matter. It is a most important one.

Having touched upon three most important points in bee-farming—namely, swarm-control, young queens, and ventilation—the reader will understand that a considerable amount of labour and intelligence must be employed in a large apiary to make the business successful. Many things have to be done, some of which can only be learnt from that great teacher, experience. It is safe to say that the main work is guided by the condition of the colony

and must be kept in advance of the season. Very often a few days of neglect cannot be made good again, and consequently causes a loss through the whole of the summer.

### BUILDING THE HIVE.

Still another factor must be kept in mind, and that is the extension of colonies by adding supers. The proper time to do this is when the brood-chamber is well populated by bees and a little honey is being gathered. Do not delay this work until swarming-cells have been commenced, for then the desired effect will not take place. When supering is done at the proper time it will greatly curtail swarming, as the additional space provided will not make the bees feel cramped for room. When putting on a super, transfer a frame containing honey and sealed brood from the brood-chamber to the centre of the super, and replace with an empty comb. This will induce the bees to commence work immediately in the upper story of their hive.

At the time of writing, breeding has reached nearly its full tide, and colonies are becoming very populous with young bees. All those that have not been overhauled this spring should be examined the first fine day and the condition of each noted. Keep a sharp lookout for foul-brood, as this is the most economical time of the year to cure it. If the queen is not laying well the hive will probably be short of stores, or if the bees have an abundance of stores she wants removing on account of age and a fresh one should be introduced.

Those desirous of rearing their own queens should commence this month.

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## THE GARDEN.

W. H. TAYLOR.

### VEGETABLE-CULTURE.

OCTOBER is the time to begin to grow *French beans*. The exact time depends on what frost, if any, may be expected, though in this matter it is best to risk something. It would not be wise to delay sowing because there may be frost, but it would be unwise to be in a hurry if late frosts are of usual occurrence. The main factor which should decide the matter is the state of the soil as regards warmth. In the Wellington District I have several times sown the last week in September. They always failed. In the

Manawatu I have lost the first lot, put in about the 6th October, but it usually is right to sow them. For the first crop Canadian Wonder is safer than the butter sorts, being hardier. Soil for these beans should be in good tilth, and be fairly rich. The beans should be sown in a broad drill in a double row, the beans being about 10 in. apart in each row, the beans being placed in quincunx order—that is, so that those in one row are opposite the intervals in the other—leaving them 5 in. apart. That is the proper way; but it is attended by some risk, as it allows nothing for losses, and as slugs are very partial to them it may cause gaps, and gaps are risky, for wind may destroy more of the plants if they lack the mutual support afforded by properly filled rows. Personally I prefer to strew the beans widely, and thin out the plants, as being the more certain way of getting good rows. Runner beans may be planted any time during the month. Somewhere in the twenties is early enough. Where this is an important crop they should be grown well, and particularly in places where the rainfall is light, as in parts of Hawke's Bay, where the surface soil is also very hot in summer. My experience last year in this place (Havelock North) was that neither peas nor French beans would grow during midsummer, and watering appeared to make matters worse, the heat of the sun being sufficient to cause the water to scald the roots. *Climbing beans*, however, did very well, and fruited till cut off by frost. This is accounted for by their deep-rooting habit. To grow these well, dig out a trench as for celery, dig a good layer of what we term "fat manure" into the bottom, fill with soil to within 6 in. of the top, and plant the beans on that surface, just press them in so as to well cover them. The beans should be 9 in. or 10 in. apart. When the plants are about level with the surface of the ground will be time enough to put in the sticks. The sticks require to be firmly placed, for if proper growth is made the tops are heavy, and wind has considerable power on them, but with the trenches it is an easy matter to firmly fix the sticks. The sticks are pushed down in to the trench on either side, the soil in the trench being loose it is an easy matter. After the sticks are in fill up the trench level with the soil. This still further strengthens the sticks. A good finish is made by running a supplejack along each side, at about one-third of the height from the top, the supplejacks on either side to be level with each other. Bind the two together with flax bands. The sticks will then stand against any ordinary wind.

In hot districts and in extra dry soil a very slight departure from ordinary methods may lead to success. Thus, peas sown at double the usual depth might succeed because the roots would

be farther from the hot surface. If this be done the plan would be to leave the drills only partially filled with soil after sowing, and finish filling when the plants are well above the level. One naturally plants lettuces in drills in dry weather, but it is not every one that thinks to do so. The advantages are very obvious. Not only is the soil at the bottom of the drill damper, but watering the young plants is greatly facilitated. Cabbages and cauliflowers may be planted in the same way.

*Peas* are to be sown still at intervals of two weeks. As the weather gets warmer I like to sow a little deeper. The depth to sow peas is generally considered to be about 4 in. I fancy few people sow so deeply. It all depends where the measurement is taken from. If from the mean surface they are not sown so deep, but when the loose soil is dragged up over them they are quite that depth. Thinner sowing is advisable now because they come up better. In this matter there is room for the exercise of judgment. When heavy rain is to be expected, as in the early part of the season, when the ground is cold and liable to run together after rain, thin sowing of anything may mean failure. I should have mentioned this in connection with French beans. A number of beans germinating together may, and do, succeed in breaking through, whereas if they were thinly sown at measured intervals they might not. This is one reason why I like to sow more than are required and thin out, as is easily done. With peas, however, it is different. They cannot easily be thinned, but there is no need for it. It is astonishing how thickly they can be sown and do well; but later crops are not so well supplied with moisture, and should not be so crowded. A pint of peas of medium-height varieties will at this time make a well-turned row of 40 yards. I would make it 10 yards less for early crops. Tall peas, meaning such as grow 6 ft. or more high, require to be sown thinly, as in addition to the height they branch freely. Plants 6 in. apart are close enough. Sow closer and cut some out when it is safe to do so.

Now is a good time to sow *rhubarb* of the evergreen varieties. The plants will have ample time to strengthen for winter use. The soil must be good; it can hardly be too rich. A good surface is necessary for a good take of seed. Sow in rows 30 in. apart and leave the plants 2 ft. asunder, or sow at half that distance and leave the plants 1 ft. apart, and cut out alternate rows and plants after using the first produce; or transplant them to other quarters. Seed is cheap enough, and it is as well not to cut things too close in case of losses. Topp's Winter is the standard variety.

At any time from now to mid-November sow *Savoy*, *broccoli*, and the tribe known as "*winter greens*," meaning the various *kales*, curled and otherwise. These last-named are of real value only in places where winter frosts prevail. They are not good quality until frost-bitten.

The main crop of *parsnips* and *carrots* should now be provided for. It is advisable to sow the seed as thinly as possible, to save labour in thinning. If the surface soil is properly prepared the seed will come up surely and quickly, as the soil will be warm.

*Tomato* plants may now be put out in most places. Where late frosts occur wait till it may be reasonably expected that danger is past. It is bad policy to hurry the plants out. A little delay is amply compensated for by greater warmth in soil and atmosphere. There are several ways of training the plants. Some do not train them at all, but let them lie on the ground. This is to court disaster, and sometimes leads to total loss from disease, which is more likely to attack them when lying on the moist ground, and is sure to be more virulent. I am aware, however, that it is useless to protest against the practice, for it will be done. A few branches laid on the ground for the plants to rest on makes matters slightly better, and will at least improve the fruit, should it survive blights, by keeping it from contact with the damp soil. I still think the system of training to wires is the best, and it is used very generally by large growers. There is more than one system of training to wires. The most simple is to put in a well-stayed post at each end of a row, and fairly strong ones, not stayed, at intervals of about 40 yards. Lightly stretch two wires, one 10 in. from the ground, the other 10 in. above that. Put in a light stick—supplejack is very good—where each plant is to go; tie these to the wires so that they will not slip. When planting, each plant should have a good ball of roots. With a trowel scrape away the surface soil, so as to remove dry crumbs and dig a hole with the trowel deep enough to let the plant down to the first joint. Do not water the plants. They make new roots quicker without water, and it is not needed. Do not pinch out the tops of the plants to make them branch; they will branch without it. Watch till shoots appear. Then pinch off all but one on each plant, selecting the ones best placed for training. The leader on each plant is to be trained up the stick till it reaches the top wire, then along it, the side shoot being led along the bottom wire. When the branches reach the next plant pinch out the top. All side shoots must be kept from growing, but the leaves on the main branches should be left. It is a mistake to suppose the fruit ripens better when fully exposed

to the sun; the reverse is the case. The plants may be 3 ft. apart, or slightly less. Do not dig stable manure into the ground. It induces disease, and the plants usually grow all too strong without it. A sprinkle of superphosphate and bonemeal may be scattered over the surface and scratched in after the plants have begun to grow well.

*Vegetable marrows, pumpkins, pie-melons, water-melons, rock-melons, and cucumbers* may be sown in the open ground. Rich soil is of less consequence for these plants than the moisture supplied by decaying vegetable matter. They will grow well on a heap of manure with a little soil thrown on it to sow the seed in, but it will be found that the roots do not penetrate far into the manure, and they do equally well on a heap of weeds or garden rubbish. This latter is made ornamental by making use of it in this manner.

*Turnip* seed should be sown in small quantities at intervals of eight weeks.

*Lettuce* should be sown thinly in lines, and afterwards thinned 8 in. or 9 in. apart. This is better than transplanting in hot weather, and is also the quickest way to get them ready for use.

*Red beet* for winter use should be sown at once.

If *leek* seed has not been sown, get it in at once.

#### THE FLOWER-GARDEN.

*Rhododendrons* and *camellias* will be benefited by a mulch of manure, or if manure is not available give some bonemeal. Lightly fork this in, and give a mulch of decomposed garden rubbish or spent hops from a brewery. If stable or any such manure is given, do not dig it in. Direct contact with the roots is apt to be injurious. Gradual washing in by rain of the nutrient properties is all-sufficient, and the remnants of the mulch keep the top soil cool and porous. Early spring-flowering shrubs will be going out of flower, and any pruning required should be done. The proper time to prune is immediately after flowering. The growth made after has then time to mature for flowering next season. Shearing is not pruning. It can never be right to prune a flowering-shrub with hedge-shears. A certain amount of uniformity of outline is of course desirable, because it looks orderly, but a dense mop is intensely ugly. The best way is to use seccateurs and shorten strong or obstructing shoots, usually leaving weaker ones alone, and, above all, trying to preserve the natural habit of the subject, because it is almost invariably the most beautiful form it can take. There are exceptions no doubt: it is said they are necessary to

prove the rule. We are now arriving at a time when the final touches for the season's effects must be given. It is now fast becoming "now or never." I am a strong believer in the "make haste slowly" policy. It is worse than useless to try to get plants or seeds out before their time, but the time having arrived a vigorous policy is required. At the end of October chrysanthemums should be planted out where they are to flower. If there is objection to a tall growth and show flowers are not required, it is quite a good plan to pinch the tops out of the plants. This will keep them dwarfer, and the flowers produced will be good enough for all ordinary purposes. Give the ground a turn with the hoe before planting, so as to kill any seedling weeds there may be.

*Sowing flower-seeds.*—This is an opportune time to fill up any vacant spaces there may be. It is good that there should be some such places available in addition to those that are to be filled with box-raised stuff. Very many of the hardy annuals are extremely beautiful, while some are also very gay as well as beautiful. Most flowers are beautiful. There are so many varieties obtainable that it would take up too much time to select them. The best plan is to try as many as possible each year in small packets. There is a world of beauty here quite unexplored by most of my readers. It is usual to get a habit of growing certain varieties, and thus many of the best are not grown. Many failures in trying to raise seeds are, I feel sure, often due to taking too much trouble. If the soil is suitable and the time right there need be no difficulty. I will say at once that if the soil is likely to run together after rain it should have the defect remedied by mixing with it enough of a mixture of sand and vegetable mould to keep it open. The soil being right, I do not think it good for any one but an experienced hand to make dents in the soil, with a piece of board or a brick maybe, and cover the seed with soil after sowing on the lowered surface. The whole is likely to get pasty, or the seed may be too deep or not deep enough; in any case such work comes to very near the margin where skilled work begins, and is fraught with danger. A more simple plan is much safer and therefore better. Seeds are liable to get too low down in porous soil, for which reason, if it has been recently dug, or from any cause is lying loose, tread it down before sowing. Being fairly firm, scatter the seed on the surface, and gently scratch it in with a rake. By this plan the soil is left in its natural state and is not liable to suffer from any little mistakes that have been made. I always find the seed comes well this way, which, after all, is about the same as the plants adopt themselves when they sow their own

seed, and they come up well enough. Mignonette-seed will grow freely sown in that way, and we often hear of failures in trying to raise it. The true reason of the success of this plan is, I dare say, because at least some of the seed gets placed at exactly the depth it best likes. Frequent watering may destroy a patch of seeds. A gentle watering through a fine rose can do no harm. It should be done with care, or the seeds may be washed down, or the soil washed away and the seed exposed to perish as soon as they germinate. All the half-hardy flower-seeds of the popular kinds—asters, celosias, &c., can be sown by the beginning of November in the open ground.

#### SMALL FRUIT.

*Strawberry* beds should be kept scrupulously clean at this time. Weeds grow so fast that they soon overrun a bed if not checked in time. In some places the weather is very hot and the soil dry at this time. A mulch must be beneficial. What it is composed of will have to depend on circumstances. Littery stable manure is, I think, best of all. In some places the soil is of a character that goes hard under treading. The mulch is just as necessary for the protection of the soil as it is for the protection of roots.

Go over *gooseberry* and *currant* bushes and push off any young shoots that are not wanted. It is quite easy now, and they become a nuisance if left. The places where superfluous shoots appear are where strong shoots or branches have been cut off.

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#### BRITISH SHEEP-SCAB ORDER.

A new sheep-scab order has been issued by the British Board of Agriculture, the main feature of which is that double dipping is required in affected areas. The double dipping must be done with an interval of not less than seven and not more than fourteen days between the dippings, and the dipping must be by thorough immersion in a sheep-dip approved by the Board. The owner, or person in charge, must give written notice of intention to dip, in order that the local authority may be represented at the dipping should this be considered desirable. After the second dipping the sheep must be kept, as far as is practicable, isolated from sheep which have not been dipped.

The prevalence of sheep-scab in Great Britain has been largely reduced since 1907, when the compulsory dipping of sheep was first enforced. It is hoped, says a communication from the Board, that by the enforcement of these more stringent orders on particular premises and in comparatively small areas the complete eradication of disease from Great Britain may be expedited.

## COMMERCIAL INTELLIGENCE.

### THE FIBRE-MARKET.

WRITING under date of London, 21st August, the High Commissioner reports to the Prime Minister, the Right Hon. W. F. Massey, P.C., on the prospects of the fibre-market as follows:—

I have the honour to acknowledge the receipt of your cablegram of the 18th instant, reading as under: "Telegraph with least possible delay market prospects of hemp to assist in deciding whether flax-mills should continue operations." In reply to which I have to-day cabled you as follows: "In answer to your telegram of the 18th August—Impossible to give reliable forecast under disturbed conditions. Business connected with hemp is practically at a standstill, chiefly on account of financial difficulty. Stoppage of Continental demand causing accumulation of stocks from every source here. Nominal quotations: New Zealand — 'Good-fair,' £24 10s. per ton; 'fair,' £22 per ton."

Business on the hemp-market is practically at a standstill, and no transactions have taken place for some days. The chief cause of the stagnation is the financial difficulty. The moratorium, lately put in force by the Government, does not help the brokers, and I understand that, generally speaking, they will not sell parcels of hemp to any of the ropemakers unless they get payment in cash in return. As it is a general thing in the hemp trade for business to be done on three months' credit, the present conditions have put a sudden check on business.

With regard to the question of demand and supply, the position would seem to be somewhat as follows: Owing to the war practically all the mills in Germany, France, and Belgium have ceased work, so that the Continental demand for hemp of all sorts is dead. The mills at Home are understood to be still working, and although the usual trade requirements have doubtless suffered through the outbreak of hostilities, the situation is somewhat balanced by an extra demand for rope, &c., for Admiralty purposes. As you will be aware, New Zealand hemp is principally used for binder-twine, and the consequence is that about half the usual consumption is cut off, for, in all probability, the Continent absorbs this amount. I understand that parcels for Germany are at present being stored, but as the cost of doing this is said to amount to £3 or £4 per ton per year, it will be seen that this cannot go on indefinitely, as, should the war last only six months this would represent a loss of about £2 per ton of hemp.

New Zealand is, of course, principally affected by manila, and the following statistical position should be noted: European stocks of manila on hand at 1st August, 100,000 bales; European stocks of manila afloat at 1st August, 85,000 bales; visible supplies, 185,000 bales. Of the 85,000 bales afloat, 20,000 have practically arrived, 25,000 are as near as Gibraltar, and the other 40,000 are more distant; so that, practically speaking, we get available European supplies of manila of nearly 150,000 bales. Consumption in normal times is from 40,000 to 50,000 bales per month, of which the Continent takes, say, 40 per cent.; but as the latter demand is now nil, and the bulk of the Continental supplies will probably come on the markets here, it will be seen that there are about four months' supplies in sight.

The outlook, therefore, is certainly not hopeful for higher quotations, and a good many consider that prices will come down. At present "fair current" and higher grades are fairly steady, but "good seconds" are down to about £18 10s. per ton. Nominal quotations of New Zealand are £22 for "fair," £23 for "high-points fair," and £24 10s. for "good-fair"; but there is no doubt that all concerned would be glad of bids at anywhere near these prices for parcels they have to sell.

Factors which would help the Government in the consideration of the position are, first, that owing to the war most countries may probably try to increase their acreage of wheat. As regards the Continent, there would appear to be some difficulty owing to the large number of men called up for service. In England, too, the

present harvest has not been gathered without difficulty, owing to the labour situation; and although in some quarters it is hoped a large acreage will be sown, it is possible that this cannot be done, owing to the shortage of labour. In the United States they have had a bumper harvest this year, but I cannot get any information as to prospects of increasing the area still further.

Secondly, nothing is known as to how the stocks of German sisal will be disposed of. This hemp is largely used by German mills for the manufacture of twine, and as they are now shut there is a possibility that the trade will go either to England or America. If to England, probably New Zealand hemp would be used, but America would most likely use Mexican.

To sum up the position, therefore, I cannot see that the demand for binder-twine will be largely increased in the near future, and in any case the Mexican sisal crop has been a good one, and large shipments have been going to America recently, so that the American mills would appear to be in a pretty good position. Should twine requirements fall off, as they may do under the circumstances, New Zealand and lower grades of manila, in common with Mexican sisal, would probably decline still further. At any rate, I am informed that although the present is the time for making contracts for hemp to cover twine requirements for 1915 nobody seems anxious to operate.

New Zealand shipments to arrive are equal to about 1,000 tons, while stocks at the beginning of the month were 600 tons—*i.e.*, a visible supply of 1,600 tons, or, roughly, one month and a half in normal times: probably three months under present conditions.

## THE PORT OF LIVERPOOL.

### PROPOSED IMPROVED HANDLING-FACILITIES FOR PERISHABLE PRODUCTS.

THE following report on improvements it is intended to effect at the Port of Liverpool for the handling of perishable produce has been received from the High Commissioner for New Zealand, the Hon. T. Mackenzie:—

I have the honour to inform you that there are now indications which point to the probability of considerable improvements being effected at the Port of Liverpool in the near future in connection with the discharge of frozen meat and other perishable produce from New Zealand. In my report to you for the year 1912 I stated that few facilities were provided at Liverpool, and indicated where the various faults lay, and mentioned that I had discussed the matter with the Mersey Docks and Harbour Board and found that they were agreeable to carry out improvements if they could be assured of increased imports. My attention was recently called to the fact that a certain amount of damage had occurred to some of our meat on account of the lack of facilities: the cold stores were unable to accept delivery sufficiently fast, with the result that meat was left in the open shed alongside the ship for a considerable time, this naturally causing deterioration. I therefore again approached the Mersey Docks and Harbour Board, and am pleased to say with good results, as will be seen from the attached extract from the reply which I have received from the General Manager of that body. I will continue to give this matter my attention, and shall report to you again when any details are available as to the proposed improvements.

[Extract from Letter from the Mersey Docks and Harbour Board to the High Commissioner, 23rd July, 1914.]

I have to inform you that for some months past my Board have been in negotiation with parties interested in the importation of frozen meat from New Zealand, for the provision of facilities exactly on the lines suggested in your letter. These negotiations are now well advanced, and I hope shortly to place a recommendation before the Board for the allotment of a particular berth at which vessels importing frozen meat from New Zealand may discharge the meat direct into an insulated sorting-shed for distribution to carts, railway-wagons, &c., or for transference to a cold store which it is proposed to erect alongside, and which will probably be connected by means of overhead or underground gangways with the berth alluded to.

## SAN FRANCISCO MARKETS.

### RUSSIAN AND CHINA COMPETITION.

E. CLIFTON.

It is quoted from an authoritative source that China shipped, via the port of Tsingtan, from the Province of Shangtung 93,000 quarters of dressed beef during 1913 to Vladivostock for the use of the Russian army there, and now from 2,000 to 3,000 cattle per month are being shipped from Tsinanfu, via the first-named port, to Vladivostock for this army requirement. It is claimed that these cattle can be sold, live weight, at 1½d. per pound at the port of embarkation. Vladivostock is distant from San Francisco 4,570 miles, Wellington 5,900. There may yet be meat from China via Vladivostock and Siberian butter shipped from that port to compete with food products from New Zealand.

The poultry association of Petaluma, the centre of the poultry industry of California, is organizing an opposition to the importation of eggs from China. It is proposed to secure legislation to prevent the introduction of the Chinese eggs into California. The delegation from Petaluma is securing general support from the poultry-farmers of the State.

It may be readily appreciated that there is an active opposition to these importations. A large number of people are engaged in poultry-raising; around Petaluma it is the dominant industry. The foreign product has at least proved a very serious competition in the egg-market of San Francisco.

By the last mail that went from here, on the 4th instant, I reported on the establishment of a line of steamships with refrigeration chambers operating between Vladivostock and the Western Pacific ports. It may be possible that there will be a certain proportion of butter and eggs shipped from the eastern seaboard of Russia to America, particularly in view of the war, that may affect the nations trading in that ocean. The beef from certain provinces of China is said to be of excellent quality, while the Siberian butter has already secured for itself approval in Great Britain and will no doubt add to its reputation in the United States.

With regard to the export of meat from China, I had the opportunity of discussing this with a gentleman of San Francisco who is acquainted with that country and who is now personally interested in the steamships between China and the United States. He is inclined to believe that possibly butter and eggs will be brought from that country here. He is not at all a believer that the Chinese beef will be of any importance.

## LINSEED.

THE High Commissioner forwarded the following report on the linseed-market under date of London, 8th June:—

From the copy of the manifest of the s.s. "Nairnshire" it was noted that that vessel on her last voyage from the Dominion brought a shipment of 330 sacks of linseed. In view of the inquiries made here some years ago with the object of ascertaining the prospects of a market for New Zealand linseed in this country, I thought it might be of interest to obtain from the consignees of the parcel in question full particulars of the shipment. The linseed was taken delivery of by Messrs. J. Robinson and Co. (Limited), oil-seed crushers, &c., Bathurst Wharf, Bristol, and they state that they consider it resembles South Russian or Turkish linseed in quality, and that in their opinion it is equal to good Plate seed in value. They gave about 46s. per quarter for it, and think there would be a ready market for seed of this kind in Bristol or at any other oil-seed-crushing port. Compared with the Indian seed the value would be about 3s. to 4s. less, owing in a great measure to the favourable contract upon which the latter is sold.

In London at the present time the linseed-market is quiet but firm, with prices steady and tending in sellers' favour. The current quotations ruling here are: Calcutta, per quarter of 401 lb., 50s.; La Plata, per quarter of 416 lb., 45s. There is no Bombay seed available just now.

## ANSWERS TO CORRESPONDENTS.

**CORRESPONDENTS** are requested, when desiring information through the *Journal* in regard to disease in animals and plants, to forward, where possible, affected specimens, in order to facilitate a correct diagnosis of the trouble and to ensure the best advice. In stating a question the most complete descriptive details should be furnished.

Correspondents desiring information in regard to manurial treatment of soil are requested to fill in and forward the prescribed form—"Application for Advice as to Manurial Treatment of Soil"—obtainable from any office of the Department in the Dominion.

In every instance a question to which an answer is desired in these columns must be accompanied by the full name of the inquirer, not necessarily for publication, but as a guarantee of good faith.

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### HUTIWAI.

E. W. TOOGOOD, Arapohue :—

Have experiments been tried to determine the best and cheapest means of stamping out hutiwai (or "biddy-biddy")? I have recently purchased a 500-acre farm which was part of a big holding, and it is badly infested with this weed. There is not much growing in the smaller paddocks, which have been used as shearing-paddocks, but in one of about 400 acres it is very thick. This leads me to think that if the place is fenced off into, say, 50-acre paddocks and heavily stocked it could be crushed out. The country is easy hill land, nearly all ploughable, and was once heavy bush.

The Fields and Experimental Farms Division :—

If your land can be cultivated this weed can easily be got rid of, but if it is country and partly grassed hills that cannot be cultivated, then it can be controlled by fires in the proper season, followed by grass-seed sowing and judicious stocking, &c. The weed is not usually of serious importance after grass is established and the country improved.

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### DISEASE OF LEMON-TREES.

THOMAS BLACKWELL, Great Barrier :—

Would you please tell me the cause of, and cure for, lemon-trees turning as though soot was all over the leaves : it appears on the fruit also. I call it "smut."

The Orchards, Gardens, and Apiaries Division :—

The original cause of black smut on the leaves and fruit of lemons is the presence on the trees of sucking-insects, usually scale of some kind. The scale insect, *Lecanium oleæ*, is very frequently found on lemons. These insects discharge what is called "honeydew," giving a sticky coating to the trees generally. On this sticky surface a black fungus makes its appearance. The most satisfactory remedy is to spray affected trees with kerosene emulsion in spring when the young scale are on the move.

*Kerosene Emulsion* : Kerosene, 2 gallons ; common soap,  $\frac{1}{2}$  lb. ; boiling water, 1 gallon. Place the soap in the water, which should by preference be rain-water. Hard water is unsuitable, but if only such is to be had, make it soft by adding some soda. Boil till the soap is thoroughly dissolved, then take it off the fire and pour the solution into the kerosene ; thoroughly churn up by placing both suction and delivery ends of the spray-pump hose in the liquid and pumping steadily for a few minutes. The emulsion should then, if perfect, form a cream, which thickens on cooling without any appearance of free kerosene. For most plant-lice (aphides) and other soft-bodied insects, from twelve to twenty parts of water are added to one of the emulsion.

## GRAFTING FRUIT-TREES.—IRONBARK PUMPKINS.

“NURSERY,” Motueka :—

When should Northern Spy apple stocks be grafted on to the roots, and of what thickness and size should the pieces of each be to make a vigorous tree? Are satisfactory results obtained by merely “striking” Spy prunings in prepared soil? Is clay satisfactory for putting round the root-graft, and, if not, what is the recipe for a good wax? What is the explanation of the number of grafts sometimes seen on young trees from the nursery? Does it mean that the stock of a yearling tree is three, four, or more years old? I noticed five grafts on a yearling Jonathan planted last year.

Does frost affect pumpkins cut and left in the open? We had a number of soft-shelled pumpkins, and they are “going” very quickly. A number of black soft spots about a quarter of an inch across appear and spread over the shell. What is the best way to store Ironbark pumpkins for the winter? We are unable to obtain pure Ironbark seed. Can you inform me where we can get some?

The Orchards, Gardens, and Apiaries Division :—

Northern Spy apple stocks are usually prepared during the winter, frequently when indoor work is desirable on account of inclement weather. A copy of the October, 1911, issue of the *Journal of Agriculture* will be posted to you if you will send your name and address to the Director of Orchards, &c., Department of Agriculture, Wellington. On page 341 you will find particulars, with illustrations, describing the preparation of Northern Spy stocks. You will note that neither clay nor grafting-wax is required in preparing Spy stocks. “Striking” Spy prunings is rarely attempted, as exceptional facilities are required for doing so successfully. Young trees are sometimes reworked because either bud or graft has failed to take, and sometimes because a nurseryman considers it desirable to rework to some other variety on account of increasing demand for that variety.

Soft-shelled pumpkins will not keep for any length of time. If it is desired to keep Ironbark pumpkins for a long period it would be as well to store them in a shed. Most nurserymen should be able to supply you with pure Ironbark seed.

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LEAF-SPOT.

GEORGE EMTAGE, Warkworth :—

I would be very glad of information on the following: The clover, lucerne, and broad beans get the leaf-spot, and I am at a loss as to a remedy. The farm in question is an island subject to salt gales, the land being of a very light nature and running sheep for the last fifty years. The former owner made it a practice to plough a piece of old grass every year, immediately harrowing down and sowing grass and clover without lime or manure. The lucerne I sowed last year was in pure sand, which as soon as it grew a foot high became badly affected with leaf-spot. I may add that before the lucerne becomes spotted it looks well, growing about 1 in. daily in warm weather.

The Fields and Experimental Farms Division :—

The leaf-spot of lucerne is caused by a fungus disease, *Pseudopeziza medicaginis*. It is more prevalent on the crops when it is undergoing a struggle to establish itself, as, for instance, during the first year of growth, especially if the season be dry. When, however, the plant is thoroughly established the leaf-spot does not do much damage, for the reason that the growth is more vigorous, and hence more fortified to withstand attack by fungus diseases such as the one complained of. Your soil being light and dry is not conducive to vigorous growth, hence we should naturally expect more leaf-spot on lucerne grown thereon. The usual treatment is to cut the crop when badly affected and cart off and burn. Should the second growth, which by the way should be more vigorous, be again badly affected, plough under the crop and resow the following season, when success will invariably be obtained—a vegetation less troubled with leaf-spot. Light soils are deficient in humus, and on such the more that is supplied by green-manuring (turning under oats, or rye, or white mustard, &c.) the more success is likely to be obtained with lucerne. On such soils also, in addition to basic superphosphate, 3 cwt. (or basic slag applied some time before sowing the seed), and sulphate of potash, 1 cwt., a nitrogenous fertilizer such as blood-and-bone manure is of value.

## DIAMOND-BACKED MOTH.

"ABOVEUR," Ethelton :—

Diamond-backed moth attacked rape and turnips early last season, riddling the leaves and arresting growth generally. Could you advise *re* a remedy for the pest?

The Fields and Experimental Farms Division :—

The diamond-backed moth (*Plutella cruciferarum*) is the adult form of a caterpillar of a pale-green colour, a quarter of an inch long, which forms a web on cabbage-leaves. The species is three-brooded. It is a difficult pest to combat, especially where cruciferous crops like turnips and rape are grown on a large scale. It is important to deal specially with the early broods of the pest in the early stages of growth of the crop. Where spraying is feasible—that is, where the crop is not extensive—pyrethrum in water or mixed with flour, hot water at a temperature of from 140° to 160° F., or kerosene emulsion sprayed over the turnip, rape, or cabbage plants, will destroy these caterpillars. Paris green or London purple is effective when used dry in the proportion of 1 oz. to 6 lb. of flour or other similar substances. Where spraying is not feasible the only thing that can be done is to cultivate well before seeding and during growth, eradicate all cruciferous weeds (wild mustard, &c.) and other rubbish that would provide host plants for the deposit of the eggs of the moth, and to manure liberally so as to encourage healthy vigorous growth.

## MAKING WINE.

"PAPANUI," Christchurch :—

In February and May *Journals* there were articles on rhubarb, parsnip, and cherry wines. In relation to these kindly give the following details :—

1. Should the clear, soft water be cold?
2. Should a wooden tub be used for the first process?
3. Should liquor and sugar be put into the cask for fermentation after the infusion?
4. Should cask be only just larger than the quantity for fermentation, or could 5 gallons be put in cask?
5. Would a port-wine cask be suitable for cask No. 1 and a brandy-cask for No. 2?
6. Parsnip: Questions as above excepting the first.
7. Gooseberry: Please furnish recipe for making this wine.

The Orchards, Gardens, and Apiaries Division :—

1. The water may be raised in temperature slightly—say, to 70° or 80° F. This would start the fermentation quicker. It should not be below 60°. If a temperature of 60° can be maintained at the start, that should be sufficient.
2. Yes.
3. After crushing or pulping the fruit the water and sugar are added, and all fermented together.
4. The tub or cask in which the fermentation is made should be large enough to allow of the liquor working without frothing over. If it is 10 gallons (about) that is being fermented a 15-gallon cask should be used.
5. For making any white wine such as parsnip, rhubarb, gooseberry, &c., use a brandy or whisky cask. For any of the coloured wines a port-wine cask may be used.
6. The replies to the above hold good, except that to the first question.
7. These questions are dealt with in the article on "Manufacture of Wine" (see *Journal of Agriculture* for July last, page 45).

## FERTILITY OF EGGS.

G. H., Orari :—

My ducks had no drake with them all winter, and a drake was put among them on the 1st September. Can you tell me on what date the eggs should be fertile and fit for setting?

The Live-stock and Meat Division :—

From ten days to a fortnight from the time the birds were mated up.

## GREEN MANURE.

E. E. COLLINS, Brydone :—

I have a plot of ground now sown in oats which I would like to plough in for green manure. At what stage should oats be to be ready for ploughing in? After the oats are ploughed in I wish to sow tares and oats for autumn feed. What quantity of same should I sow? Should they be sown mixed or separate? What season should they be sown? Also advise as to manure and quantity, and varieties of tares and oats. Please advise where to obtain tare-seed.

The Fields and Experimental Farms Division :—

The oats should be ploughed under about the time they are beginning to head. Plough under during moist weather, and use a chain attached to the beam of the plough so as to draw under all green material. Of oats and tares, sow these mixed at the rate of  $1\frac{1}{2}$  bushels of oats and 1 bushel (60 lb.) of tares (common or the Black Scotch Winter vetch). A good oat for that purpose is Garton's Waverley. Others are Abundance and Triumph. The older variety, Storm King, provides abundance of green feed. Sow the oats and tares about a month after turning under the present oat crop, the time varying with the extent of humidity occurring—the more humidity the faster the decomposition. Prominent seedsmen in the South stock vetch-seed, and you should have no trouble in obtaining it. As manure use 2 cwt. to 3 cwt. of superphosphate and 1 cwt. of blood-and-bone manure per acre. If lime is readily procurable apply  $\frac{1}{2}$  ton of ground burnt lime, after which application greater value will be obtained from the superphosphate.

## SEEDING FOR TURNIP AND RAPE CROPS.

C. MONTEITH, Reefton :—

Will you kindly inform me *re* the following :—

1. What quantity of swede-seed is usually sown per acre broadcast on a ploughed field?
2. What quantity of same is usually sown per acre with other grass-seeds on bush burn?
3. What quantity of rape-seed is used per acre on ploughed field, sowing broadcast?

The Fields and Experimental Farms Division :—

1. Broadcasted, sow 2 lb. to 4 lb. per acre.
2. On bush burn with grass mixture, about 2 lb. per acre.
3. Rape broadcasted, 10 lb. to 12 lb. per acre.

## FOWL AND COW MANURE.

“AMATEUR,” Wellington :—

Can you tell me the best way to use poultry-manure in flower and vegetable garden? I am told that it has a bad effect if used as gathered fresh. Would cow-manure be of any use if merely spread close alongside the rows, where potatoes, peas, beans, &c., have been sown?

The Orchards, Gardens, and Apiaries Division :—

Poultry-manure should be mixed with dry earth or sand before being worked into the soil. It is not desirable to use it fresh and unmixed. Cow-manure is valuable, but should be well incorporated with the soil.

## GARDEN QUESTIONS.

S. C. L. MCCOLL, Amodeo Bay :—

What is the best treatment for blighted onions? When about half-grown mine took mildew, then turned sooty, the top dying down, but were far enough on to be of use. When just coming into bearing my peas take disease of some kind, the bottom leaves turning yellow, with black spots. The crop was small and of short duration. I have great trouble with grubs on tomatoes: what is the best remedy? I am also troubled with leaf-curl on roses, &c.

### The Orchards, Gardens, and Apiaries Division :—

As a preventive against attack by mildew, onions should be sprayed with the Bordeaux mixture (4-5-50 strength). Peas also benefit by the use of the Bordeaux mixture at the same strength. Outdoor tomatoes should be sprayed with the Bordeaux mixture (4-5-50 strength) with the addition of  $1\frac{1}{2}$  lb. arsenate of lead. This combined spraying-mixture will control both the caterpillar which attacks tomatoes and also fungus diseases.

### BLACK APHIS.

#### B. G., Waihao Forks :—

I have two Japanese plum-trees, and each year they have a great show of fruit. As soon as the fruit is formed they become badly infested with what I call "black aphis," and two-thirds of the fruit falls. What is the best preparation to use as a spray?

### The Orchards, Gardens, and Apiaries Division :—

MacDougall's insecticide can be recommended as an effective remedy for the control of black aphis. This compound should be applied at a strength of 1 gallon to 50 gallons of water.

### POTATO-FERTILIZER.

#### WALLACE BOOTH, Wharepoa, Thames :—

Kindly give me information on the following: What fertilizer would you advise using on 2-acre plot of land for a main crop of potatoes (land situated in Avondale)? Would it be advisable to plough the fertilizer in before setting? What quantity of fertilizer is required?

### The Fields and Experimental Farms Division :—

Without a more detailed description of your soil we can supply you only with an application for potatoes grown on an average loam soil, as follows: 3 cwt. superphosphate, 1 cwt. sulphate of potash, and  $\frac{1}{2}$  cwt. sulphate of ammonia or 1 cwt. blood-and-bone manure, per acre. We would prefer sowing the fertilizer in the bottom of the drill before planting the potatoes. If, however, the soil is light and open it would be better to sow half in drill and half broadcasted on the surface of the soil, and this worked in with a stroke of the tine harrow later.

### TURNIPS FOR FATTENING.

#### W. MENZIES, Banks Peninsula :—

What kind of turnip is best to sow, and when to put it in, for fattening full-grown wethers or big cattle in the middle or late part of winter. My land is on fairly dry spurs, facing north on the hills of the Banks Peninsula, about 900 ft. above sea-level.

### The Fields and Experimental Farms Division :—

A turnip possessing special hardness, yellow-fleshed, an excellent keeper, suited to thin soils, and possessing excellent sheep- and cattle-feeding qualities, such as is to be found in Garton's Green-top Scotch Yellow turnip, or Purple-top Scotch Yellow turnip, is recommended for your conditions. Sow towards the end of January or early in February, at a time when there is sufficient moisture to give the crop a good start; also manure fairly well with a reliable turnip-manure

### LUCERNE SURFACE-SOWN.

#### FARMER, Maniototo :—

Kindly let me know if it would do to surface-sow lucerne-seed on a small patch which was sown last October, the crop being too thin.

### The Fields and Experimental Farms Division :—

Should the conditions as regards suitability of soil for success with lucerne adequate drainage, absence of grass and weeds, thorough cultivation, liming, and

manuring) have been attended to or reasonably so in the first place, it would be advisable to broadcast a little seed on the previous seeding. Should, however, the condition of the soil be at fault because of disregard of the above-mentioned conditions, it would be more satisfactory to plough the poor stand under and resow when the green material turned under has for the most part decomposed. If the seed is thought to be at fault, either in quality or quantity, surface seeding may be resorted to. The dry conditions of your locality, however, are not particularly favourable to surface seeding. Scatter the seed at a time when rain is imminent, following this with a top-dressing of superphosphate and discing with a light disc. Later, stimulation with about 1 cwt. per acre of nitrate of soda might be given.

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#### BLIGHT ON TOMATO-PLANTS.

J. HAMMOND, Mount Albert :—

What is the best way to prevent blight on tomato-plants? Also advise me if a mixture of blood and bone with sulphate of potash and sulphur-flour would be suitable for tomato-growing? Would the same mixture be suitable for onions? Kindly furnish a better mixture if there is one.

The Orchards, Gardens, and Apiaries Division :—

Tomato-blight can be readily controlled by spraying with the Bordeaux mixture, 4-5-50 strength. Care should be taken to cover every portion of the plants with the mixture, especially the stems and the under-sides of the leaves. Blood and bone is a good manure for tomatoes. Experiments carried out with sulphate of potash and flowers of sulphur seem to indicate that the plants do not derive much benefit from the application of either. Further experimental work in this direction will, however, be carried out. Superphosphate is recommended for onions, applied at the rate of from 2 cwt. to 3 cwt. per acre in advance of the seed or plants.

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#### NEGLECT OF FRUIT-TREES.

NEIL PAE, Waikino :—

I noticed on an old settler's farm some neglected fruit-trees, perhaps thirty years old and covered with disease. Will these have any bad effect on my orchard which I am planting after preparation next winter? Have the Government Inspectors instructions for taking care of such cases of neglect?

The Orchards, Gardens, and Apiaries Division :—

It is not, of course, desirable to have a neglected orchard in the vicinity, but spraying-compounds such as are now available will, if applied thoroughly and systematically, keep an orchard practically free from infection in spite of neglected trees existing in the neighbourhood. The Government Inspectors are endeavouring as far as possible to see that the necessary attention is given to such neglected fruit-trees as you mention.

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#### SPRAY FOR FRUIT-TREES.

JOHN C. WARLOW, St. Albans, Christchurch :—

Please tell me in the *Journal of Agriculture* if the soda Bordeaux is a suitable spray for fruit-trees, as it is a big job to get lime (fresh) for each spray. If not, is there any other spray or any other way to mix Bordeaux, as it means getting a bag of lime each time, and I have only a few trees and I wish to keep them as clean as possible.

The Orchards, Gardens, and Apiaries Division :—

For the spraying of fruit-trees the lime Bordeaux is much to be preferred to the soda Bordeaux, as it is much more adhesive and effective in controlling disease. The difficulty of keeping the lime fresh may be overcome by using tin containers, such as disused biscuit-tin. After filling with the fresh lime, paste paper round the lid so as to keep out air and moisture.

## LUCERNE, ETC.

H. RAYMOND SMITH, Towai :—

I am sending the accompanying sample of soil to be analysed. It is taken from a drained alluvial flat, an acre of which I have ploughed up with the idea of trying lucerne. This particular acre, previous to ploughing, was covered with a thick mat of cocksfoot, which seeded last summer. The soil has a depth of 6 in. subsoil, 2 ft. of alluvial sand, and then sandy clay. One ton of lime is being applied.

1. Can you advise me as to the particular kind of manure needed?
2. Is it possible to grow lucerne on such land without a special preparation crop, or without inoculated soil?
3. Do you advise sowing in drills?
4. If sown in September, when would the crop be ready to feed, and to what extent should it be cut the first year?
5. What is the name of the enclosed weed, which is scattered sparsely throughout the acre to be experimented upon? Is it easily eradicated?
6. Would it be advisable to burn and sow a hillside (fair-quality soil, manuka and fern, cut this month) with *paspalum* next November?
7. Can you advise me as to a work which names and describes every tree and shrub of New Zealand forest, particularly of the North Island?

The Fields and Experimental Farms Division :—

Soil-analyses are not undertaken until it is found whether advice cannot be given from particulars supplied by the applicant, as an analysis is a somewhat lengthy process. However, I should advise you as follows :—

1. Use about 3 cwt. per acre of basic slag, worked in right away, and 1 cwt. sulphate of potash at time of sowing the seed.
2. Provided you are sure the land is absolutely clean you could grow lucerne without previous preparation of the soil, otherwise it will be advisable to clean the land with a drilled, well-cultivated crop of potatoes, turnips, or rape. You could clean the land with a crop of soft turnips or rape and sow the lucerne in the early autumn. The soil may permit, however, of your sowing the lucerne in drills (about 10 in. apart) this spring and cultivating to rid the ground of grass and weeds. Your soil being rich alluvial, it would appear to be unnecessary to inoculate, but inoculation with soil that has already grown lucerne would certainly help.
3. Sow in drills if there is any doubt as to the cleanness of the soil, even after preparatory crop.
4. This will depend upon the growth as influenced by soil and its treatment, and the season. Conditions being favourable it should, however, afford a cutting in late summer or early autumn. It is not advisable to cut it much the first year, and do not cut it at all close. Certainly do not graze it the first year, more particularly by sheep. When established, cut when one-tenth to one-third in bloom.
5. The weed has not come to hand, and I shall be glad if you will forward another specimen.
6. Provided you can obtain a good burn, and provided there is sufficient rain in November to germinate the seed, you could sow the *paspalum* then, though earlier sowing would be more desirable, this demanding earlier cutting and burning.
7. Cheeseman's "Manual of the New Zealand Flora" should meet your purpose.

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SALT IN BUTTER.

DAVEY BROS., Jerusalem, Wanganui River :—

What amount of salt should be used in preparing separator butter for immediate sale, and when should the salt be worked through the butter?

The Dairy-produce Division :—

When butter is for immediate sale on the local market a light salting is usually desired, and the addition of 1 lb. to 2 lb. of salt to each 100 lb. of butter is sufficient. Of course, a portion of this salt is lost in working the butter on an ordinary butter-worker. The salt should be added to the butter when it is in the granular form and be evenly distributed throughout the mass, and then be carefully worked so as to thoroughly incorporate the salt to ensure uniformity of colour in the product when finished. A bulletin on the making of butter on the farm can be obtained on application.

## PULPING STRAWBERRIES.

"SUBSCRIBER," Whangarei :—

What is the best way to pulp strawberries? Is it better to keep the pulp in jars or tins?

The Orchards, Gardens, and Apiaries Division :—

The method of pulping strawberries is much the same as that of canning or bottling fruit, except that the fruit is thoroughly sterilized by heat in its own juices without the addition of syrup. It is immaterial whether jars or tins are used, but in any case the sterilizing to prevent fermentation must be carefully carried out, and the containers, whether jars or tins, hermetically sealed.

## CURING HIDES.

"BACKBLOCKER," Ngaroma :—

Could you tell me how to cure a hide so as to keep it soft and pliable.

The Live-stock and Meat Division :—

Take 5 lb. of alum to 4 lb. of coarse salt, and dissolve in water. The liquid should float a potato. If the hide is fresh and clean it should be soaked for at least a fortnight in the liquid. It should be turned and handled every day so as to make it pliable. When removed from the liquid it should be dried slowly and not exposed to the sun.

## SHELL LIME.

G. W. DARVALL, Ngaio :—

Can the Department suggest a method by which ordinary sea-shells can be converted into lime, in such a form as can be used in field and garden?

The Fields and Experimental Farms Division :—

The only feasible method that we can advise as to the production of lime for field and garden use from ordinary sea-shells is to make use of a crushing plant as used for grinding limestone rock. Finely ground shells, as with limestone, yield the carbonate form of lime. Oyster-shells, when finely ground, have been shown by analysis to yield a highly useful lime possessing a high percentage of lime carbonate.

## DEATH OF MACROCARPA-TREES.

"SCOTIA," Lower Matakana :—

Please let me know the cause of, and a remedy for, young macrocarpa-trees (one to three years old) gumming and dying out.

The Orchards, Gardens, and Apiaries Division :—

Without more detailed information as to the source from which the young trees came, and as to the conditions under which they are grown, we cannot definitely state what is the cause of the trouble. From the information supplied, however, we are of the opinion that it is due to a disease which attacks many trees, known as "gummosis" (*Cladosporium epiphyllum*). The disease causes the extrusion of abnormal quantities of gum, which flows from any wound or exudes through cracks in the bark. Degeneration of the wood-cells, and especially of the cell-walls of a soft wood formed by abnormal activity of the combium, points to its origin being due, in some cases at any rate, to a conversion of the cellulose, and fungi are sometimes found in the masses of gum. The primary extrusion of gum is said to be entirely due to the action of the fungus, which acts as a wound parasite, entering the tissues through small wounds in the bark, broken branches, and where leaf-buds and flower-buds have been broken off. The whole mass of gum exuded eventually drops to the ground, carrying the various forms of reproductive bodies of the fungus along with it, where they remain until the following season, when

they again infest the plant. Where the tree is badly attacked it would be advisable to remove and burn it. Where only a portion is apparently attacked, prune off the affected part and spray the tree. For this use a solution of potassium sulphide or self-boiled lime-and-sulphur wash. Along with such treatment remove the surface soil and replace with fresh soil, with a layer of quicklime on the surface.

#### FERTILIZATION OF PEARS.

A. L. COOPER, Otahuhu :—

I have heard that when Bon Chrétien pears are grown away from all other varieties of pear-trees the flowers are rarely fertilized. Take, for instance, an orchard 15 acres of which is planted in Bon Chrétien pear-trees, and in close proximity are apples and peaches growing, would the fertilization of the pear-flowers be good under the circumstances?

The Orchards, Gardens, and Apiaries Division :—

It is not desirable to have very large blocks of many varieties of fruits, including Bon Chrétien pears, and it may be regarded as necessary to have varieties inter-mixed in order to secure interpollination.

#### GREEN FEED FOR COWS.

"DAIRY-FARMER," Pukekara :—

I am anxious for information regarding the growing of successive crops for feeding to dairy cows, and would be glad of an outline of crops to grow for a season's feed. The soil is light, inclined to sandy, and part is heavier, with whitish clay subsoil, although free to work, being old swamp land.

The Fields and Experimental Farms Division :—

For providing a succession of green feed for dairy cows the following crops should prove most suitable: Cape barley, 72 lb. per acre; Prussian-blue peas and Algerian oats, 1½ bushels of each; Western Wolths grass, 30 lb. per acre; Italian rye and common spring vetch, 30 lb. of each; Emerald rye, 84 lb.; and common vetch, 30 lb. Of these the Cape barley will probably come in first, and will provide periodic cuttings throughout the season right into the winter. Assuming that you want to feed these crops as early as possible, the Cape barley could be sown any time now. Sow the peas and oats at the end of September or early in October. The Italian rye and vetches could be sown middle of October, while the Emerald rye and vetches could be sown a little later. The Western Wolths could be sown about the same time as the latter. As both the Italian rye and the Western Wolths require rich soil, these should be grown on the swamp land, reserving the lighter soils for the oats and rye mixtures and barley. Lime, applied at the rate of ½ ton per acre of burnt lime for the swamp area and 1 ton per acre of finely ground limestone for the lighter soil, will greatly increase results. Earlier application of the lime would, of course, have been more desirable. As manure for the Cape barley on the light land use 2 cwt. basic superphosphate (or ordinary superphosphate if soil limed) and 1 cwt. blood-and-bone manure per acre. For the Emerald rye and vetches, also for peas and oats on the same soil, use 2 cwt. to 3 cwt. basic superphosphate and 1 cwt. blood and bone. For Italian rye and vetches on the swamp, also Western Wolths, use 3 cwt. to 5 cwt. basic slag (or 2 cwt. to 3 cwt. superphosphate if soil well limed) and 1 cwt. muriate of potash per acre.

#### BACON.

DUDLEY RICHARDS, Little River :—

Would you kindly inform me whether the bacon would taste sweet if pigs were fed on acorns, or is it advisable to top them off with grain before killing?

The Live-stock and Meat Division :—

The feeding of pigs partially on acorns will not have any injurious effect upon the flavour of the bacon, but a reasonable supply of pollard or grain for topping off is in all cases beneficial.